Corsair Xpert DDR400 RAM | Intel 64-bit Desktop Pentium 4 | VIA Dual PCI-E & AGP Chipset

A Sandhills Publication

CPU®
COMPUTER POWER USER

Q&A With Senh Duong

Rotten Tomatoes, Movies & The Crash
(page 108)

Use Your Registry
To Lock Out Tweakers
(page 96)

nForce4 SLI Mobos &
Graphics Cards Put To The Test
(page 16)

Phase-Change
Cooling Mod, Part I
(page 39)

DREAM PCs

page 54

PCs That Make You Break A Sweat

April 2005 • Vol. 5 Iss. 4

$5.99 U.S.
$7.99 Canada

CREATIVE®

ZEN
MICRO

2500 songs

5 GB

∘ Actual Size

The power of ZEN

∘ Micro-sized MP3 player ∘ Mesmerizing blue glow ∘ Curved to fit in the palm of your hand

∘ Up to 12-hour battery life on a single charge ∘ Removable battery to extend playtime another 12 hours

∘ FM radio ∘ Voice recorder ∘ Intuitive vertical touch pad control

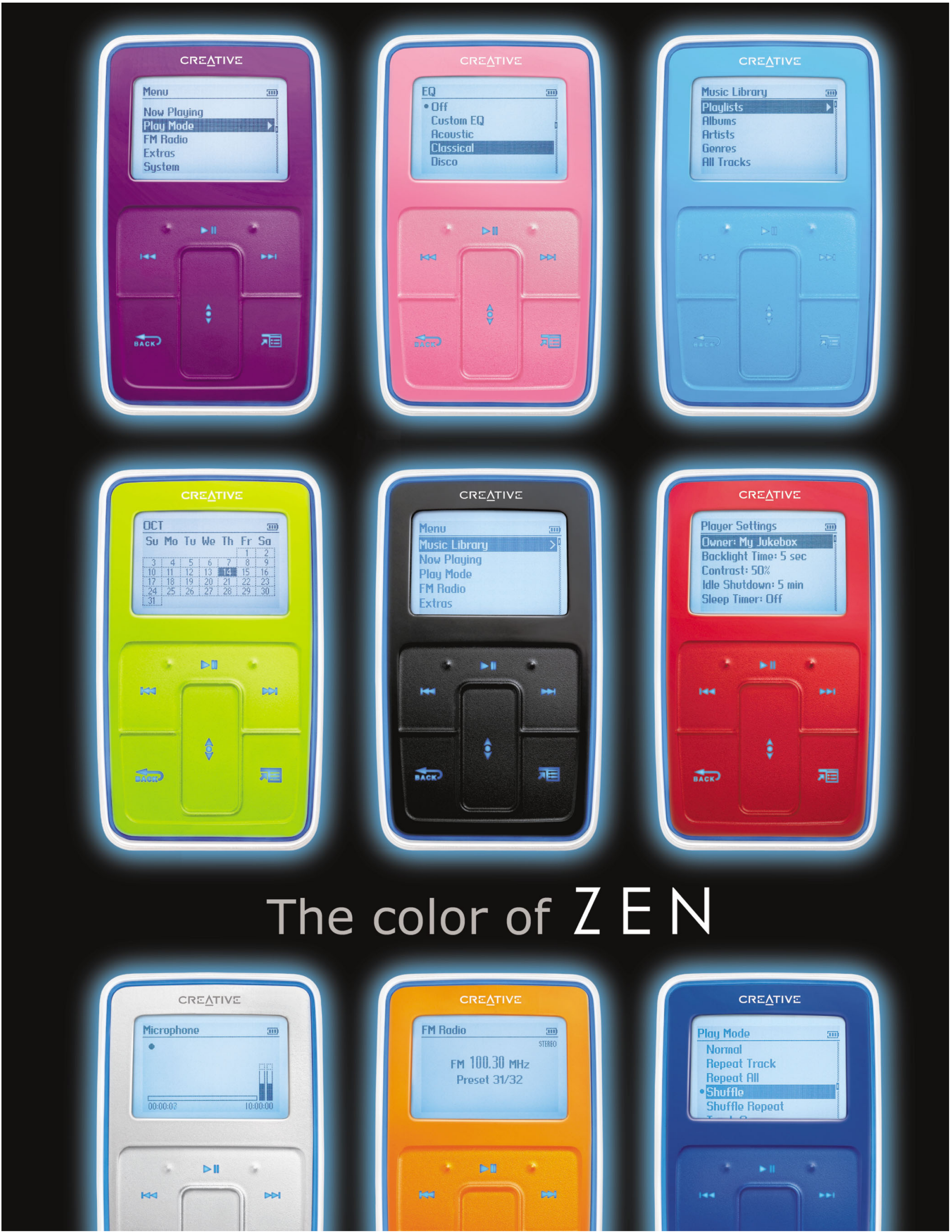
∘ Access over 2 million songs through Zen supported online music services

msn music

playsforsure Windows Media Audio

us.creative.com/zenmicro

©2005 Creative Technology Ltd. All rights reserved. The Creative logo is a registered trademark of Creative Technology Ltd in the U.S. and other countries. All other trademarks are the property of their respective owners.


CREATIVE
Menu
Now Playing
Play Mode
FM Radio
Extras
System
CREATIVE
EQ
Off
Custom EQ
Acoustic
Classical
Disco
CREATIVE
Music Library
Playlists
Albums
Artists
Genres
All Tracks
BACK
CREATIVE
OCT
Su Mo Tu We Th Fr Sa
1 2
3 4 5 6 7 8 9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31
CREATIVE
Menu
Music Library
Now Playing
Play Mode
FM Radio
Extras
CREATIVE
Player Settings
Owner: My Jukebox
Backlight Time: 5 sec
Contrast: 50%
Idle Shutdown: 5 min
Sleep Timer: Off
BACK
The color of ZEN
CREATIVE
Microphone
00:00:07
10:00:00
CREATIVE
FM Radio
STEREO
FM 100.30 MHz
Preset 31/32
CREATIVE
Play Mode
Normal
Repeat Track
Repeat All
Shuffle
Shuffle Repeat

CPU
COMPUTER POWER USER®

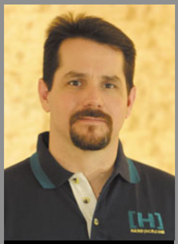
April 2005 • Vol 5 Issue 4

Frontside

6 What's Happening
12 Digital Economy
14 **The Saint**
The Giant Mess

The Experts

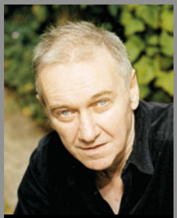
Joan Wood
Forward Slash
page 89

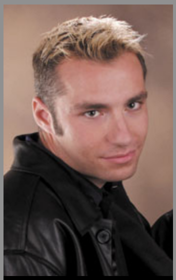

Kyle Bennett
[H]ard Talk
page 37

Chris Pirillo
Dialogue Box
page 83

Alex St. John
The Saint
page 14

Anand Lal Shimpi
Anand's Corner
page 35


Mike Magee
Shavings From The Rumour Mill
page 101


Alex "Sharky" Ross
The Shark Tank
page 36

Rob "CmdrTaco" Malda
The Department Of Stuff
page 88

Pete Loshin
Open Sauce
page 84

Spotlight

54 **Dream PCs**
Leaders Of The Pack

67 **Kings Of The Road**
Our Magnificent Mobile Dream PCs

Copyright 2005 by Sandhills Publishing Company. *Computer Power User* is a trademark of Sandhills Publishing Company. All rights reserved. Reproduction of material appearing in *Computer Power User* is strictly prohibited without written permission. Printed in the U.S.A. GST # 123482788RT0001 (ISSN 1536-7568) *CPU Computer Power User* USPS 020-801 is published monthly for $29 per year by Sandhills Publishing Company, 131 West Grand Drive, P.O. Box 82667, Lincoln, NE 68501. Subscriber Services: (800) 424-7900. Periodicals postage paid at Lincoln, NE. POSTMASTER: Send address changes to *Computer Power User*, P.O. Box 82667, Lincoln, NE 68501.

Did you find the hidden CPU logo on our cover? Turn the page for the answer.

Heavy Gear

15 **Dream Hardware**

16 **SLI Motherboard & Video Card Roundup**
It Doesn't Get Any Faster Than This

26 Intel P4 3.6Ghz (660) 64-bit &
Intel P4 3.73GHz Extreme Edition

27 VIA PT-Series Chipsets Preview
Corsair Xpert DDR400 Memory

28 DFI NF4 Ultra-D Motherboard
SilverStone LC10M HTPC Case

30 Sony DRU-720a DVD±RW Drive
Falcon Northwest FragBox 2 Chassis

31 Planet Computers HDX700

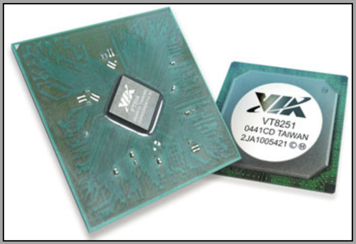
32 **Designer Case Face-Off:**
ASUS vs. ThermalRock

34 **Audio Advantage Micro**
ATI TV Wonder Elite

35 **Anand's Corner**
Much Ado About Cell (Part I)

36 **The Shark Tank**
Remember VIA Technologies?

37 **[H]ard Talk**
64-Bit & You



Hard Hat Area

PC Modder

38 **Tips & Tutorials**
39 **Chill, Baby, Chill**
Build Your Own
Phase-Change Cooling System
44 **Advanced Q&A Corner**
46 **X-ray Vision: Microengines**
Batteries, Meet Your Potential Replacement
50 **White Paper: Single-Electron Transistors**
SETs Hold Promise For Shrinking Devices

Loading Zone

73 **The Bleeding Edge Of Software**
Inside The World Of Betas
74 **Up To Speed**
Upgrades That'll Keep You
Humming Along
76 **Calling Home**
A Roundup Of Remote-Access Programs
80 Apple iWork '05
81 ScanSoft Dragon NaturallySpeaking 8
82 Carry-A-Tune Technologies
Singing Coach
Orb Networks Orb
83 **Dialogue Box**
Podcasting: Evolution or Revolution?
84 **Open Sauce**
My Free Logo Adventure

Caught In The Web

86 **CinemaNow**
Tomorrow's Video Store Today
Web **Coder's Corner:**
XML Schemas Using RELAX NG
88 **The Department Of Stuff**
blogging.txt
89 **Forward Slash**
A Girl & Her Toys

Digital Living

90 **Road Warrior**
Getting Local, What We
(Already) Know About
Cell Phones & Driving,
PDAs For Census-Taking
& More From The Mobile Front

92 **At Your Leisure**
Plug In, Sit Back & Fire Away

Tips & Tricks

96 **Software Tips & Projects**
Your Antitweaker Toolkit
98 **Warm Up To Penguins**
Playing Windows Games
Under Linux With Cedega

What's Cooking

101 **Shavings From The Rumour Mill**
Intel Pushes Full Speed Ahead Button
102 **Technically Speaking**
An Interview With Barbara Mikkelson,
Your Urban Legend Tour Guide
106 **Under Development**
A Peek At What's Brewing
In The Laboratory

Back Door

108 **Senh Duong**
Rotten Tomatoes, Movies & The Crash

Infinite Loops

Strange stats and other
oddball items from
computing's periphery

87, 97, 99

CORRECTIONS: March 2005 (page 78): Oops, Outlook Express does indeed have a spelling checker. And yes, OE does support multiple accounts, but it only lets you view one at a time. Thunderbird gives you the option of viewing them all in a single, combined Inbox, but OE does not.

GREETINGS FROM SAMITLAND

We look forward to our annual roundup of dream PCs, and this year was no exception. These monsters are leaders of the pack and would make even the most hardened PC veteran flush with excitement. If looks could kill, these would have you on your back in a flash. As is usual with our picks, beauty is more than skin deep. Pop the sides and you'll find superb layouts, cable management, and hardware. These crème de la crème systems can be had by anyone for the price. And if you want similar performance but at a more "budget" price, you can use these as templates for the system you want to build. I've modeled my own "budget" SLI system around some of the design ideas I studied in these beasts. The desktop rigs start on page 54, and the sizzling mobile coverage begins on page 67. Be sure to check out the paint job on that Falcon Northwest laptop on page 71. In the immortal words of Keanu Reeves, "Whoa."

The cover story is certainly enticing, but we get down to the component level in our "SLI Motherboard & Video Card Roundup" on page 16. We take on a variety of nForce4 SLI-related motherboards and video cards and put them through a bevy of tests to help you pick the pieces for your next big upgrade. We follow that up with coverage of Intel's new 64-bit desktop CPU on page 26. Is it all that? Find out for yourself (also see the column on page 37). Don't miss out on the VIA PT-Series preview (and check out the related column on page 36). AGP and PCI Express on a single motherboard? Hmm, that alone ensures that the PT gets a more in-depth look in an upcoming issue. Those of you interested in phase cooling should visit our coverage on page 39. It's the first of a two-part piece that should give you the goods on what you need to know before undertaking a similar project yourself. And those of you sick of chain email with questionable events/stories will really appreciate our interview with the woman behind Snopes.com.

Yeah, this is a smorgasbord issue, and we hope you'll gorge yourself. I've lost 10 pounds since I started getting healthy for the New Year, so I'll be gorging myself right along with you. Now it's off to the Intel Developer Forum to check out dual-core and then onward to Hotlanta to see Wife Julie. I look forward to seeing you again next month!

Samit G. Choudhuri, Publication Editor, *CPU*

Sandhills Publishing

Customer Service
(For questions about your subscription or to place an order or change an address.)
customer-service@cpumag.com
800-733-3809
FAX: (402) 479-2193
Computer Power User
P.O. Box 82667
Lincoln, NE 68501-2667

Hours
Mon. - Fri.: 7 a.m. to 8 p.m. (CST)
Sat.: 8 a.m. to 4 p.m. (CST)
Online Customer Service & Subscription Center
http://www.cpumag.com

Web Services
(For questions about our Web site.)
webhelp@cpumag.com
(800) 368-8304

Authorization For Reprints
(800) 334-7458
FAX: (402) 479-2104

Editorial Staff
editor@cpumag.com
FAX: (402) 479-2104
131 W. Grand Drive
Lincoln, NE 68521

Subscription Renewals
(800) 382-4552
FAX: (402) 479-2193
http://www.cpumag.com

Advertising Staff
(800) 848-1478
120 W. Harvest Dr.
Lincoln, NE 68521
FAX: (402) 479-2193

The Gang

Editorial Staff: Ronald D. Kobler / Samit Gupta Choudhuri / Blaine Flamig / Trista Kunce / Corey Russman / Rod Scher / Christopher Trumble / Calvin Clinchard / Kimberly Fitzke / Katie Dolan / Raejean Brooks / Rebecca Christensen / Tara Weber / Sally Curran / Michael Sweet / Katie Sommer / Jennifer Suggitt / Nate Hoppe / Sheila Allen / Linne Ourada / Elizabeth Dixon / Brian Weed / Joy Martin / Sarie Whitson / Ryan Syrek / Marty Sems / Chad Denton / Nathan Chandler / Kylee Dickey / Josh Gulick / Andrew Leibman / Vince Cogley / Samuel Evans / Jennifer Johnson **Web staff:** Missy Fletcher / Brandie Humphrey / Laura Curry **Customer Service:** Lindsay Albers / Becky Rezabek / Lana Matic **Subscription Renewals:** Liz Kohout / Connie Beatty / Matt Bolling / Patrick Kean / Charmaine Vondra / Miden Ebert / Kathy DeCoito / Stephanie Contreras / Nicole Buckendahl / Travis Brock **Art & Design:** Lesa Call / Fred Schneider / Ginger Riley / Carrie Benes / Aaron Weston / Aaron Clark / Sonja Warner / Leigh Trompke / Lori Garris / Jason Codr / Andria Schultz / Erin Rodriguez / Lindsay Anker / Kelli Lambertsen **Newsstand:** Garth Lienemann / Kelly Richardson / Chris McGreer / Jeff Schnittker / Scot Banks **Advertising Sales:** Grant Ossenkop / Cindy Pieper / Brooke Wolzen / Eric Cobb / Emily Getzschman **Marketing:** Mark Peery / Marcy Gunn / Amber Coffin / Jen Clausen

Gotcha.
Here it is.

Simply Astonishing. Astonishingly Simple. Avidea™.

Avidea is the astounding audio and video home theater experience without the complexity. So state-of-the-art, yet so extraordinarily easy to connect and operate, Avidea is all the fun with none of the frustration.

And, since sound always drives the image, prepare to be stunned by The Boston Sound.™ Movie soundtracks have incredible power and detail. CDs, AM/FM, even MP3s sound truer to the original performance.

The Avidea 770 System simply allows you to get the most out of home theater no matter what kind of TV you own. Visit bostonacoustics.com/idea to learn more about Avidea 770 and its authorized dealers.

www.BostonAcoustics.com

Boston
Boston Acoustics

Your Sound Solution™

© 2004 Boston Acoustics, Inc. All Rights Reserved. Avidea, The Boston Sound and Your Sound Solution are trademarks and Boston, Boston Acoustics, BostonAcoustics.com, and the Boston logo are registered trademarks of Boston Acoustics, Inc.

Compiled by
Steve Smith

$1-Per-Hour Computing On Demand

Why shouldn't computer power be like water or electricity—a utility you turn on and off and purchase only as needed? That is the concept behind the newly launched Sun Grid. Companies and universities can run processor-intensive projects over the Internet on Sun's grid of 10,000 computer nodes and pay only for the processor time and storage space they use. Most projects require multiple CPUs (mostly 2.4GHz Opterons) working cooperatively, but you are charged at a rate of $1 per CPU hour in the same way the electric company charges kilowatt hours. Many experts believe that in the next decade home computing, too, will follow this model and move from standalone PCs to low-power workstations that tap into a grid of on-demand CPU power and storage. ▲

What can you do with a buck?
Introducing the Sun Grid.
Sun™ Grid Compute Utility
Computing Power When You Need It
Sun microsystems

Sun CEO Scott McNealy shows off his big buck, a new $1-per-CPU-hour grid computing and storage service.

Tiny Towers Drive Big Laptop Sound

Tired of laptop audio that sounds worse than your cell phone's reception? If you don't mind packing an extra small pouch with your luggable PC, then try Altec Lansing's innovative XT1 speakers. At 7.5 inches high x 1.9 inches wide x 1.3 inches deep, the flat-panel satellites aren't weighed down by batteries or a power block. They draw 1.5 watts of audio output from the USB port. Each midget tower boasts two micro drivers with special bass enhancements to deliver a convincing low end without a subwoofer. An auxiliary jack accepts an external MP3 player, as well. Small in size but not in price, the XT1 comes with connector and carrying pouch for $129. ▲

Altec Lansing's XT1 laptop speakers deliver 1.5 watts of output without batteries or a power block.

i-mate's PDA monster not only has every wireless, phone, camera, and Pocket PC amenity imaginable, but it also jacks into Skype's P2P Internet phone network.

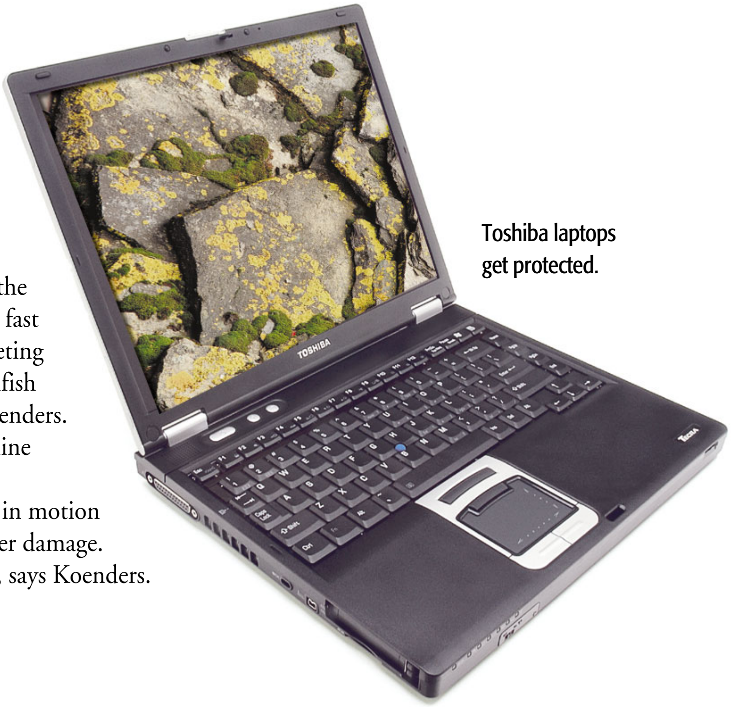
PDA-zilla! All This & Wireless VoIP, Too

Every once in a long while a new gadget is so feature-rich, so over-the-top convergent, that it kinda scares us. A smartphone/PDA hybrid with Wi-Fi, Bluetooth, a QWERTY keypad, mobile Web browsing over the GPRS wireless network, and camera is impressive, but not shocking. What got us trembling in anticipation for this $850 (yikes!) i-mate PDA2K (www.imate.com) is that it leverages Wi-Fi capability to become a VoIP phone when it is in an 802.11b hotspot. Using software from the peer-to-peer Internet phone network Skype (www.skype.com), the PDA2K detects usable WLAN signals and flips from making pricey calls via a cell phone network to making free global calls via Skype. The mobile phone companies should be very scared of this PDA-zilla. ▲

Toshiba Says

It's Time To Get Stingy

Once unrivaled in the laptop space, Toshiba lost its lead when the company started selling some of its best tech inventions such as fast hard and optical drives to other manufacturers for use in competing laptops. Now Toshiba wants its edge back and will practice "selfish innovation," according to European general manager Oscar Koenders. "We keep the best technology for our own products for six to nine months. After that we commoditize it." For example, the new EasyGuard data protection technology wraps vital components in motion sensors, air cells, and even rubber bands to resist shock and water damage. Michael Dell will have to wait awhile before licensing this stuff, says Koenders. "We'll cut him off for six to nine months." ▲



Toshiba laptops get protected.

Hardware Mole

MP3 Phone Home

The beauty of Bluetooth is that it can connect just about everything. To wit: The X2 MEGA Player 522BT (www.x2usa.com) is a flash memory music player that can synch with your BT-enabled mobile phone to monitor incoming calls and even record your phone conversations. The 522BT also breaks new ground with its color OLED display, the next-gen technology that uses organic materials rather than liquid crystals to illuminate a screen. This 2½-ounce bright-eyed eavesdropper comes in 512MB ($199) or 1GB ($249) versions and also has a built-in FM radio.

RipGuard Frustrates DVD Pirates

Ahoy, DVD pirates! Prepare to be boarded. Macrovision has updated the way it prevents DVD copying with RipGuard, a digital rights management system specifically designed to thwart PC-based DVD ripping software. Until now, it was relatively easy to crack a DVD's antiquated CSS encryption format and distribute the files on disc or over P2P networks. Macrovision, one of the popular copy protection providers for DVDs, says RipGuard either prevents the major disc hacking programs from de-encrypting movie files entirely, or it slows the process so radically that pirates will give up in frustration. Arghh!

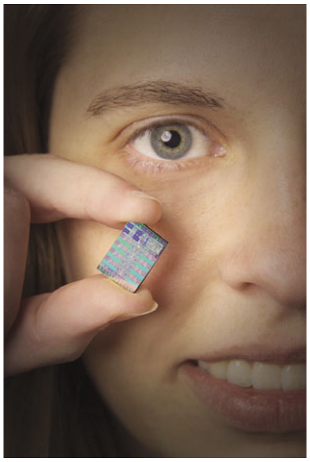
Hold your phone up to your Dyson vacuum, and it can tell tech support what ails it.

Dyson Vacuums Phone Home

Nope, no April Fool's joke (and you know how partial we are to April Fool's). New models of the famously powerful Dyson vacuums can communicate by phone with support staff and tell them the replacement parts it needs. Self-diagnostic computer chips hold the model number and even how long the unit has been used, and they alert the owner when something breaks down. You call Dyson and (we couldn't make this up) just hold the phone up to the vacuum cleaner, which sends binary codes over the line. Well, the Dyson always did look a bit like R2D2, so we couldn't help but include this.

Compiled by Dean Takahashi

Sony, IBM & Toshiba Unveil Cell Microprocessor

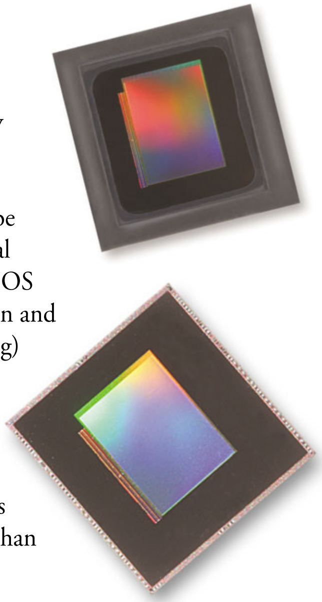


IBM, Sony, and Toshiba announced their new "supercomputer on a chip," dubbed the Cell microprocessor. The companies say the chip will run at speeds 4GHz or faster, process as many as 256 billion calculations per second, and have 234 million transistors. Jim Kahle, an IBM fellow, says the Cell will likely run applications about 10 times faster than current PCs. Each Cell chip is modular in design, consisting of one 64-bit PowerPC control processor that parcels out data and eight accompanying "synergistic processor elements" that do the serious number crunching. Sony will use the Cell chip for its PlayStation 3 game console, Toshiba will use the chip in high-definition TV sets, and IBM plans to use the chip in servers and workstations. Full told, Toshiba, Sony, and IBM say companies can put Cell chips in everything from handhelds to supercomputers because the chips are modular, fast, and power efficient. Sony and IBM will produce the Cell chip for the PS3, which is expected to debut in 2006. ▲

Rambus Boosts Bandwidth For Cell

One of the big challenges surrounding the Cell microprocessor is feeding it enough data to keep it busy. That's why Sony turned to Rambus for input/output and memory interface technology that will shoot data like a fire hose. Combined, the Rambus solutions, FlexIO and XDR DRAM memory interface (formerly code-named Redwood and Yellowstone, respectively), can pump 100GBps into the Cell microprocessor. The 70 plus gigabytes per second of the FlexIO interface is about 10 times faster than current PCs, while the 30 plus gigabytes per second of the XDR DRAM memory interface is about eight times faster. FlexIO clears the way for the CPU to connect at high speeds to the chipset, processor, or southbridge. Rambus licensees Samsung, Elpida, and Toshiba will make XDR DRAM chips to use as main memory in systems such as Sony's PS3. ▲

Micron Technology Launches Camera Phone Sensor Chips



Micron Technology is one of the world's biggest memory chip makers. The company is now diversifying into the imaging chip market with its new DigitalClarity CMOS imaging chips. The company says its low-cost chips will be able to capture 2MP images for camera phones and digital cameras. The MT9D111 chips will not only include CMOS image sensors, but they will also have built-in compression and image-processing functions (such as panning and zooming) normally implemented in companion chips. The chips will also include on-the-fly detection of bad pixels and the ability to correct them by routing around them. General samples of the chip will be ready in April and production will follow thereafter. The upshot is that many camera phones will have better image quality than some standalone digital cameras. ▲

Watching The Chips Fall

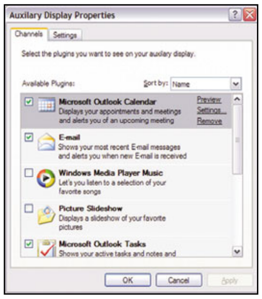
Here is pricing information for AMD and Intel CPUs.

Released	Original Price	Current Price	Last Month's Price
AMD Athlon XP 3200+ 400MHz FSB			
5/26/2003	$464**	$159	$129
AMD Athlon 64 2800+			
1/6/2004	$193**	$111	$123
AMD Athlon 64 3000+			
9/23/2003	$218**	$141	$155
AMD Athlon 64 3200+			
9/23/2003	$417**	$187	$195
AMD Athlon 64 3400+			
1/6/2004	$417**	$199	$217
AMD Athlon 64 3500+			
6/1/2004	$500**	$275	$251
AMD Athlon 64 3700+			
6/1/2004	$710**	$465*	$459*
AMD Athlon 64 3800+			
6/1/2004	$720**	$555	$599
AMD Athlon 64 4000+			
10/19/2004	$729**	$685	$729
AMD Athlon 64 FX-53			
3/18/2004	$733**	$749	$598
AMD Athlon 64 FX-55			
10/19/2004	$827**	$851*	$849*
Intel Pentium 4 3.2GHz 800MHz FSB			
6/23/2003	$637**	$249*	$255*
Intel Pentium 4 3.2GHz 800MHz FSB 1MB cache			
2/2/2004	$278**	$215	$214
Intel Pentium 4 3.4GHz 800MHz FSB			
2/2/2004	$417**	$271	$269
Intel Pentium 4 Extreme Edition 3.2GHz 2MB cache 800MHz FSB			
11/3/2003	$925**	$910*	$789
Intel Pentium 4 Extreme Edition 3.4GHz 2MB cache 800MHz FSB			
2/2/2004	$999**	$1,322	$1,322
Intel Pentium 4 Extreme Edition 3.46GHz 2MB cache 800MHz FSB			
11/2/2004	$999**	$1025*	$1035*
Intel Pentium 4 520 2.8GHz 1MB cache 800MHz FSB 90nm			
6/27/2004	$178**	$163*	$163*
Intel Pentium 4 530 3.0GHz 1MB cache 800MHz FSB 90nm			
6/27/2004	$218**	$182*	$177*
Intel Pentium 4 540 3.2GHz 1MB cache 800MHz FSB 90nm			
6/27/2004	$278**	$229*	$229*
Intel Pentium 4 550 3.4GHz 1MB cache 800MHz FSB 90nm			
6/27/2004	$417**	$299*	$278**
Intel Pentium 4 560 3.6GHz 1MB cache 800MHz FSB 90nm			
6/27/2004	$637**	$419*	$413*
Intel Pentium 4 570 3.8GHz 1MB cache 800MHz FSB 90nm			
11/15/2004	$637**	$637**	$637**

* Retail price
** Manufacturer's price per 1,000 units

Other current prices, if indicated, are lowest OEM prices available through Pricegrabber.com.

Longhorn Gets A New View



Select the plugins you want to see on your auxilary display.

☑ Microsoft Outlook Calendar
Displays your appointments and meetings and alerts you of an upcoming meeting

☑ E-mail
Shows your most recent E-mail messages and alerts you when new E-mail is received

☐ Windows Media Player Music
Let's you listen to a selection of your favorite songs

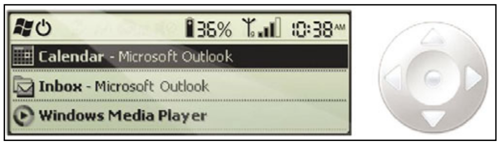
☐ Picture Slideshow
Displays a slideshow of your favorite pictures

☑ Microsoft Outlook Tasks
Shows your active tasks and notes and

Under the next version of Windows, you will be able to access email, appointments, and even photos without cracking open your laptop lid.

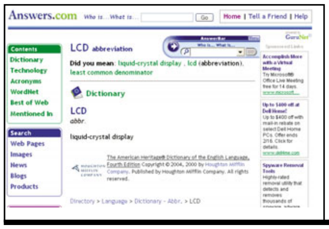
Photos courtesy of Paul Thurrot.

Notebook and Tablet PCs soon will have the same secondary LCD on their lids as many cell phones. The next generation of Windows, code-named Longhorn, will support "auxiliary displays" that can live on a notebook lid and display time, new inbox messages, appointment alerts, or even images. The displays will have their own memory cache and ARM processor, so they would be able to pull data from the PC and make it available even if the main unit is off or in standby mode. Buttons to the side of the display let users navigate menus and data. Microsoft is calling on hardware developers to imagine new uses for the feature and have them ready for Longhorn's release sometime in 2006. ▲



Please Pose Your Question In The Form Of A Click

If you have ever wished that every word in every one of your programs was hyperlinked to more information, then try 1-Click Answers from GuruNet (www.answers.com). Once installed, the program stays in memory and recognizes when you ALT-click any word on-screen. It calls up your default Web browser and executes a search on that word in Answer.com's online reference library of definitions and articles. We ALT-clicked Longhorn, for instance, and Answers.com knew that the capitalized version referred to Microsoft's next-gen Windows, not a steer, and gave us an entire history of its development. ▲



LCD abbreviation

Did you mean: liquid-crystal display , lcd (abbreviation), least common denominator

Dictionary

LCD
abbr.

liquid-crystal display

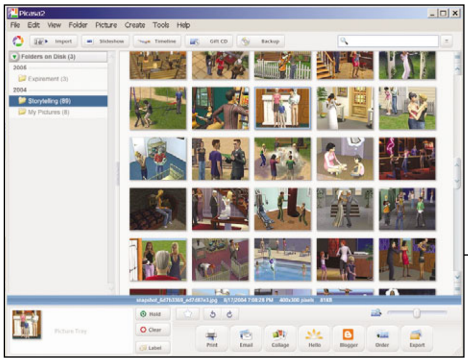
The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2004, 2000 by Houghton Mifflin Company. Published by Houghton Mifflin Company. All rights reserved.

Directory > Language > Dictionary - Abbr. > LCD

Just ALT-click any word on any page in any program, and 1-Click Answers will send you to definitions and related links.

Software Shorts

Google Gets The Picture



Google's new photo tool did such a good job of scanning our hard drive for images that it even found all of our Sims 2 Storyteller pics.

Google's new image management software Picasa 2 is garnering praise for being a full-featured photo organizer and editor at a very affordable price . . . free. The search goliath bought out Picasa's developer last year and substantially upgraded the program to be part of its ever-growing suite of software that encourages users to gather and share their information. When it starts, Picasa 2 finds all of the photos on your PC and organizes them into named folders for you to rearrange, label, and distribute by CD, blog, or email. Is Google angling to be the new Kodak?

Waiting On Firefox

The makers of Mozilla's very popular alternative browser Firefox may be getting a bit self-conscious. "In a move that I would hope should surprise exactly nobody," said lead developer Ben Goodger in his blog, the Firefox 1.1 revision to the recent 1.0 release will miss its original March release target. The Mozilla team needs more time to incorporate and test the mountain of patches and fixes the wildly successful launch generated. Things could take even longer now that Goodger himself took a job with Google. Although Goodger will continue directing Firefox development, the move reignites speculation that the search engine plans to release its own browser sometime soon.

When One PC Is Not Enough

Stardock (www.stardock.net) may redefine power user with its upcoming Multiplicity software ($39.95) that lets you control up to two separate PCs and their displays from a single keyboard and mouse. Once Multiplicity is properly configured, you gain control of each PC simply by moving the mouse cursor off the edge of the current display where it is picked up on the adjoining display and then you can run programs on that PC. A Pro version ($69.95) controls three or more PCs and even shares clipboard contents across the PCs. One PC for Half-Life 2, and one for everything else. Ah, heaven!

Spy Hunters Resign From The Club

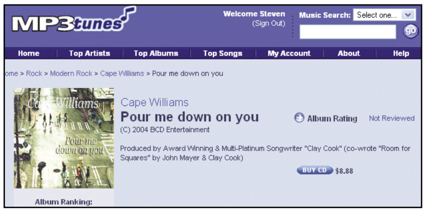
Some believe that traditional espionage agencies are consumed by internal politics and infighting, and surprisingly this seemed to happen in the spyware hunting realm. The major providers of anti-spyware solutions, WebRoot, Pest Patrol (Computer Associates), Aluria Software, and Lavasoft all resigned recently from their own trade group, COAST (Consortium Of Anti-Spyware Technology). Several of the companies cited different reasons for leaving, but much of the controversy resulted because COAST allowed adware vendors such as 180solutions into the organization and certified their products as "spyware-free." Webroot, maker of the popular SpySweeper, said in a statement that although it supported dialogue between anti-spyware vendors and adware makers, "we are not comfortable with the idea of COAST as a certification body or as a marketing tool for member companies." COAST's original mission was to bring together anti-spyware vendors to create spy-killing standards, educate the public with research on the problem, and encourage better software hygiene and respect for consumer privacy among publishers. Some in the industry suggested that COAST's goals actually conflicted with the financial interests of the spy-hunter vendors themselves, who stand to gain millions from defending companies against unchecked spyware invaders. It is all worthy of a spy novel. ▲

C.O.A.S.T.
Consortium Of Anti-Spyware Technology Vendors
Webroot Software
Privacy. Protection. Peace of mind.
AluriaSoftware™
Security & Performance Solutions
LAVASOFT
protect your privacy

The founding members of the COAST anti-spyware software coalition left their own organization in a dispute over whether the group was getting too cozy with adware makers.

No-DRM Future, But No Stars, Either

The founder of the original MP3.com and champion of downloadable music in the late 1990s, Michael Robertson, wants to return to the good old days of unfettered, unprotected MP3s. His newly launched MP3Tunes.com challenges big music services such as iTunes and Napster on price (88 cents per song) and convenience (no digital rights management software to limit how and where a buyer uses the song he purchased). Robertson says consumers are frustrated by inconvenient DRM wrappers and obtuse music subscription schemes imposed by the major song portals to appease the big record labels. "A consumer-friendly digital music store that provides true music ownership to paying customers can triple the digital music business almost overnight," he says. Sure, individuals can trade unprotected music illegally, but pirates are trafficking these tunes anyway, Robertson argues. Making fee-based downloads less of a hassle encourages consumers to stay honest and pay up. MP3Tunes says $6 of the $8.88 album sale price goes to the artist. The service claims to offer 300,000 songs from 22,000 artists, but you'll find more indie labels and garage bands than Billboard chart toppers here. For now, at least, no DRM equals no Green Day, no 50 Cent. ▲



ome > Rock > Modern Rock > Cape Williams > Pour me down on you

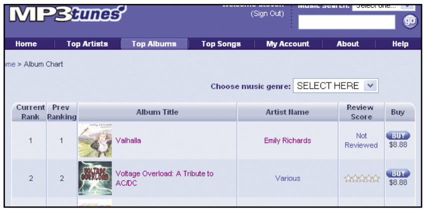
Cape Williams
Pour me down on you
(C) 2004 BCD Entertainment

Album Rating Not Reviewed

Produced by Award Winning & Multi-Platinum Songwriter "Clay Cook" (co-wrote "Room for Squares" by John Mayer & Clay Cook)

$8.88

Album Ranking:



me > Album Chart

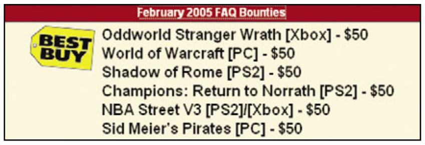
Choose music genre: SELECT HERE

Current Rank	Prev Ranking	Album Title	Artist Name	Review Score	Buy
1	1	Valhalla	Emily Richards	Not Reviewed	BUY $8.88
2	2	Voltage Overload: A Tribute to AC/DC	Various	☆☆☆☆☆	BUY $8.88

Christian contemporary and a tribute to AC/DC sit atop MP3tunes' eclectic indie library.

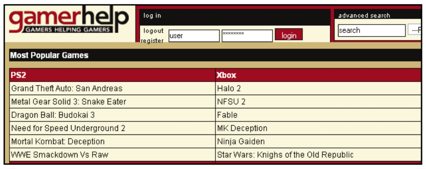
GamerHelp.com Gives BaQ For FAQs

IDG Entertainment is rewarding the gaming community for helping one another. Its new GamerHelp.com site of user-generated game hints and walk-throughs puts a bounty on new FAQs that other visitors need. Major retailers such as Best Buy offer gift cards of $50 or $100 to the first person who submits a game FAQ not already in the library. Needy gamers can submit requests for these walk-through and tip sheets, which GamerHelp.com posts with a bounty price attached to each. Rewards also go out to the help document that visitors ranked highest for the month. Of course, it's always nice when a site gives back to users, but $50? Have you ever seen the amount of obsessive (nay, downright scary) care and detail that goes into some of these game FAQs? Those dudes must live in that game nonstop for weeks with a PC on one side and a sixer of BAWLS energy drink on the other. (Trust us, we might just know too much about this.) God bless them. But $50? ▲



February 2005 FAQ Bounties

Oddworld Stranger Wrath [Xbox] - $50
World of Warcraft [PC] - $50
Shadow of Rome [PS2] - $50
Champions: Return to Norrath [PS2] - $50
NBA Street V3 [PS2]/[Xbox] - $50
Sid Meier's Pirates [PC] - $50



user
search

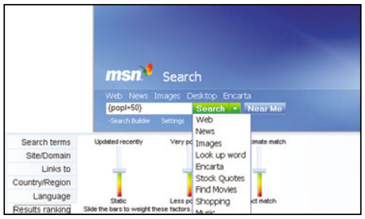
Most Popular Games

PS2	Xbox
Grand Theft Auto: San Andreas	Halo 2
Metal Gear Solid 3: Snake Eater	NFSU 2
Dragon Ball: Budokai 3	Fable
Need for Speed Underground 2	MK Deception
Mortal Kombat: Deception	Ninja Gaiden
WWE Smackdown Vs Raw	Star Wars: Knighs of the Old Republic

$50 an FAQ? At this rate we can retire . . . in 2075.

MSN Search: Expert-Built, Search Champ Approved

Microsoft is hard at work making sure that everyone knows that it has launched MSN Search. The engine seems to offer an interesting alternative to its rivals, especially for geeks like us. The Search Builder feature integrates advanced filters into the main interface, so you can tweak how results get ranked and the languages, countries, and domains to include or exclude, etc. Oshoma Momoh, general manager for program management at MSN Search, credits this feature set to expert and user input. The company invited influential leaders in search technology (dubbed the Search Champs) to preview and comment on the product this past October and then erected a well-trafficked blog in November that accepted user feedback. "I can't emphasize enough how good I feel about the dialogue we've engaged in with customers," says Momoh. We can't say we're wholly convinced, however. MSN Search invites you to enter real-world questions in the search box such as, "How heavy is the earth?" We got listings for earthmover machinery. OK, so they're still new at this. ▲



MSN vies with Google and Yahoo! by embedding a host of search-tweaking tools into its main interface.

New On The 'Net

SEWDORKEY
Nutty Chocolate
Super cool faux peanut action.
the Pink Sprink
Classy & sophisticated - the evening gown of donuts.
Choco Techno
Get your groove on choco style.

Yes, these hand-sewn felt donuts really are sugar-free.

Donuts That Never Go Stale

If you love your Krispy Kremes but wish for a no-carb, low-cal alternative, then try the felted donut flavors at the appropriately named Sewdorkey.com. These hand-sewn treats are made of colored felt and come in all the usual iced, glazed, and even filled varieties. Customers are so happy with the service that they are sending in photos of themselves posing with their fuzzy snacks. And yes, even though you are mail ordering the dunkers, Sewdorky does guarantee their freshness. At $12.95 each, they should. Then again, Jenny Craig isn't so cheap either.

Lifehacker.com: Geek Lite

Don't have the time or inclination to ingest hard-core computer bibles such as, well, *CPU*? The professionally run and sponsored (by Sony) blog, Lifehacker.com gives casual techies a daily drive-by of tech tips and news. "Don't live to geek; geek to live," the site recommends, and so it compiles new sites, downloads, and computer tips that put tech in its place—a tool we use to get on with our lives. OK, nice point. But here at *CPU*, we think that chrome-plated, fully modded PCs that glow orange are necessary tools for living . . . our lives, at least.

Lifehacker.com blogs PC tips and download links for those poor misguided souls who don't obsess over their hardware.

Band Camp For The Hip

Want to know what Ektomorf did last week or where to find the latest pics of Erykah Badu? The Bandnews.org portal focuses solely on music bands, sampling 600 news sources and offering audio samples from many of these acts. Registered users can get personalized news profiles because, after all, do fans of Germany's Brainless Wankers (we're not making them up) really want to read the latest about Jessica Simpson? Do any of us?

BIOS Upgrades Available Online

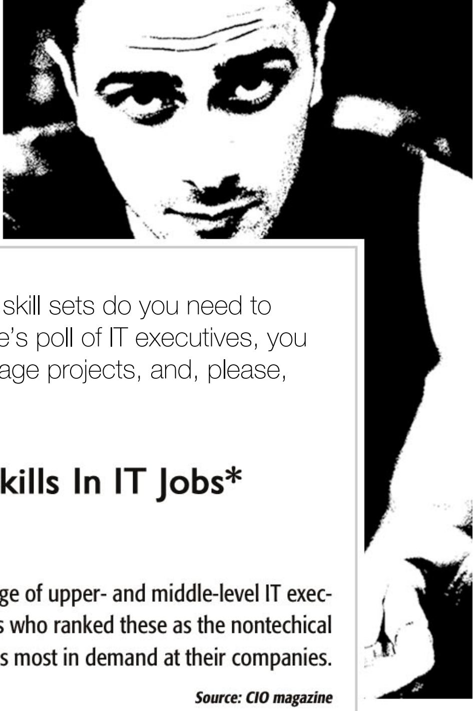
Compiled by Kevin Savetz

Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new outlook on life. Here are a few recently released upgrades. Readers can check out www.cpumag.com/cpuapr05/bios to see our entire upgrade list.

Motherboard	Date Available	URL
ABIT AA8	01/14/2005	www.abit-usa.com/downloads/bios/bios_revision.php?categories=1&model=202
ABIT KV8	01/13/2005	www.abit-usa.com/downloads/bios/bios_revision.php?categories=1&model=178
AOpen i915Pa-EFRII	02/04/2005	download.aopen.com.tw/userdownload_List.aspx?RecNo=9057&Model=i915Pa-EFRII
ASUS A8V-E Deluxe	02/04/2005	www.asus.com/support/download/download.aspx
ASUS Terminator A7VT	02/04/2005	www.asus.com/support/download/download.aspx
Biostar M7NCD	01/25/2005	www.biostar-usa.com/mbdownloads.asp?model=m7ncd

The Job Search

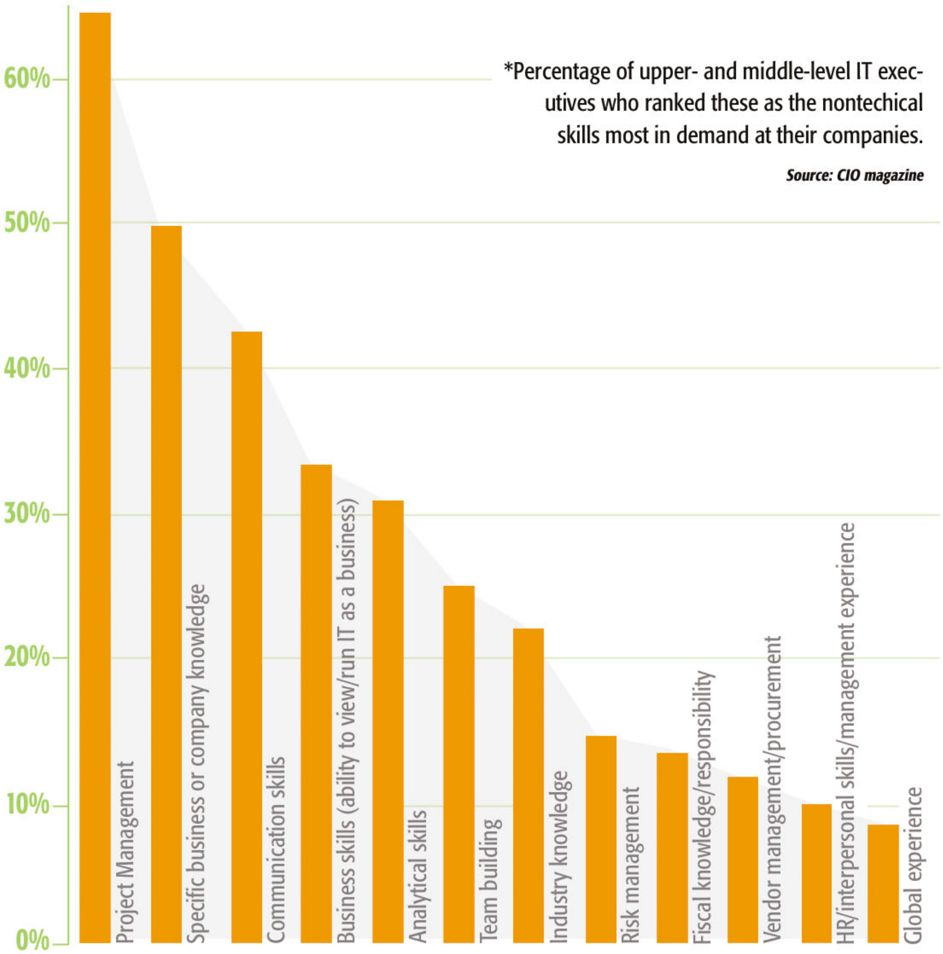
Do you like to walk geese? Are you a Napoleon Dynamite look-alike who doesn't mind standing there looking like, well, Napoleon Dynamite? Or do you have an ugly pooch that might work as a mascot for a demented public access cable TV show? Then check out Tribe.net's compendium of whacked-out job and for-hire postings the classifieds site simply calls OutRaGeousS listings. You will find here all of those offerings along with people peddling weird talents such as a singer illustrating his songs on an Etch A Sketch. There's even a beginner fire dancer for hire who promises to drop his flaming baton at least five times during his show and help burn down whatever you need destroyed. "I'll bring the fire staff and you bring the fire department," he says.



The Well-Rounded Techie

Other than your technical expertise, what other skill sets do you need to impress your boss? According to *CIO* magazine's poll of IT executives, you should know your company, know how to manage projects, and, please, learn how to speak and write.

Most In-Demand Nontechnical Skills In IT Jobs*



*Percentage of upper- and middle-level IT executives who ranked these as the nontechical skills most in demand at their companies.

Source: CIO magazine

RAW DATA

5%

Percentage of U.S. Internet users who use RSS feeds

Pew Internet & American Life Project

175,930,735

U.S. wireless subscribers as of Feb. 25, 2004

CTIA

27%

Percentage of Internet users in the United States who read blogs

Pew Internet & American Life Project

1 trillion

Minutes U.S. mobile phone customers will use in 2005

CTIA

ZALMAN
Zalman USA, Inc.

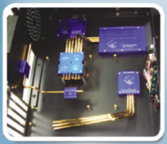
For Reliable, Enjoyable Computing...

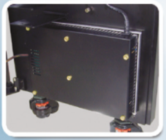
Cooling is Key...
Silence is Golden...

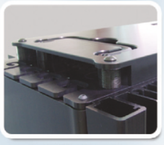
TOTALLY NO NOISE COMPUTER CASE

TNN 500AF (Available Soon)

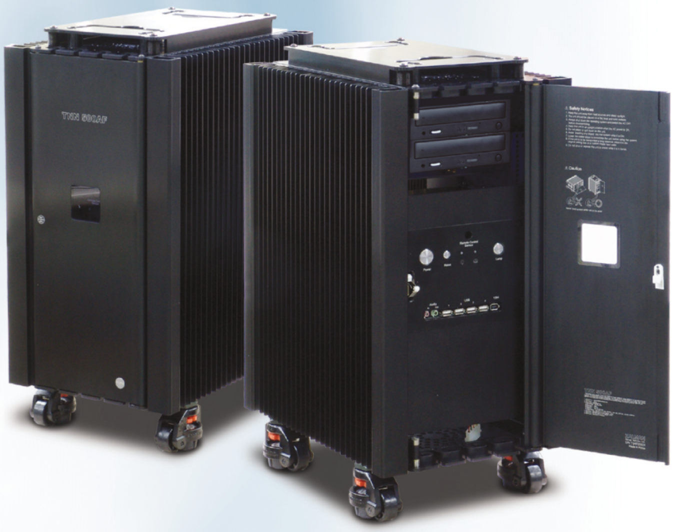
Completely Noiseless System
Semi-permanent & Long-Lasting
High-Efficiency Power Supply
Dramatically Reduces Dust Accumulation
Shields Electromagnetic Interference
Foundation for a Stable System
Reduces Maintenance Cost
Uses Environmentally Friendly Components

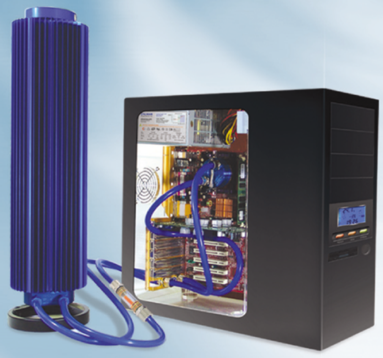

Fanless Heatpipe Coolers


Fanless Power Supply


Foldable Handles

Key Lock



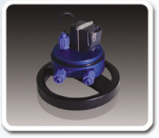


FANLESS WATER COOLING SYSTEM RESERATOR 1

- The world's first fanless water cooling system
- Optimized design for excellent natural convection cooling
- Convenient 3-in-1 design (Reservoir, Pump, Radiator)
- Compatible CPU Socket : 775, 478, 462, 754, 939, 940

CPU Water Block
ZM-WB2 Gold

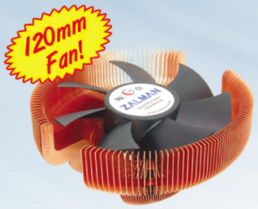
VGA Water Block
ZM-GWB1 (option)


Water Pump
(Built into Reserator)

Flow Indicator

HIGH PERFORMANCE
ULTRA QUIET CPU COOLER CNPS7700

Supports both Intel & AMD (Socket 775, 478, 754, 939, 940)



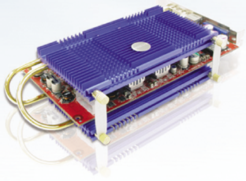
- Does not generate noise or vibration in Silent Mode.
- Pure Copper and Pure Aluminum base materials ensure excellent heat dissipation.
- Intel Pentium 4 (Socket 478/775), AMD Sempron/ AMD64 (Socket 754/939/940) compatible design for broad compatibility.
- 120mm fan inside the FHS maximizes airflow and makes installation easier.
- Adjustable fan speed controller (FAN MATE 2) enables control of noise and fan performance.

QUIET CPU COOLER CNPS7000B/LED

Supports both INTEL & AMD (Socket 478, 462, 754, 939, 940)

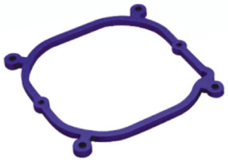
- Does not generate noise or vibration in Silent Mode.
- Pure Copper and Pure Aluminum base materials ensure excellent heat dissipation.
- 92mm fan inside the FHS maximizes airflow and makes installation easier.
- Adjustable fan speed controller (FAN MATE 2) enables control of noise and fan performance.
- To use this product on Socket 775, ZM-CS1 must be purchased separately.

QUIET VGA COOLER ZM80D-HP

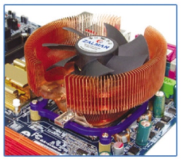


- This product was designed to optimize heat dissipation for excellent cooling performance.
- Dual heatpipes increase heat transfer speed and enhance the cooling efficiency.
- The fanless design ensures completely noiseless and maintenance-free operation.
- RAM heatsinks for cooling the VGA RAM.
- Optional ZM-OP1 recommended for higher-end VGA cards.

OPTION CLIP SUPPORT ZM-CS1



- This Clip Support allows the installation of CNPS7000 series onto Socket 775



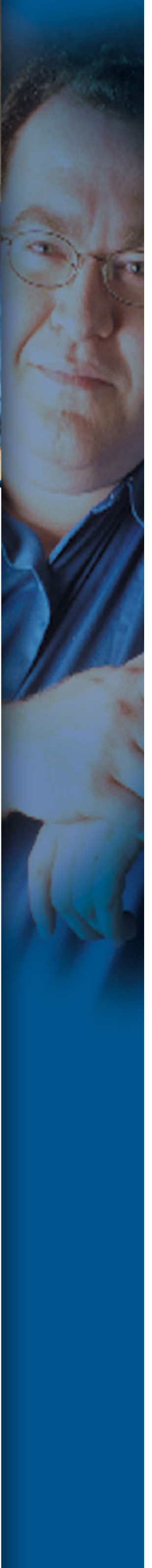
Please see website for complete list of "Where To Buy"

Contact: Zalman USA, Inc.
10531 Garden Grove Blvd., Garden Grove, CA 92843
(888)ZALMAN-6 (714) 530-0700 / http://www.zalmanusa.com

The GIANT Mess

by Alex St. John

Alex St. John was one of the founding creators of Microsoft's DirectX technology. He is the subject of the book "Renegades Of The Empire" about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multimedia browser. Today Alex is President and CEO of WildTangent Inc., a technology company devoted to delivering CD-ROM quality entertainment content over the Web.



In December 2004, Microsoft took a Giant step down the path to completely closing access to the Internet for anything but Microsoft software, while confirming its complete loss of control over Windows security, by acquiring anti-spyware company Giant Software. Think about it: Why does Microsoft need to buy a third-party to fix Windows, so installing software can't screw it up permanently? It can't think of a way to ensure that any software installed on Windows can reliably be uninstalled by a consumer? It doesn't know how to tell the difference between a stable, working version of Windows and one that has been corrupted?

Instead of solving the problem that loose operating-system architecture created, Microsoft is going to block all non-Microsoft online software functionality and dump the burden of understanding the difference between responsible software (that's not provided by Microsoft) and Malware on the consumer. Fortunately for the company (although it can't tell the difference), is that Giant brings it this expertise. Here are some quotes from the Giant Web site on identifying signs of spyware:

"I see pop-up advertisements all the time. . . . If you see pop-up ads as soon as you turn on your computer or when you're not even browsing the Web, you may have spyware or other unwanted software on your computer."

So, for example: Microsoft's update service messaging, Microsoft IM, plugging itself; MSN pushing a passport account; and Windows Media Player constantly suggesting new updates. Great! All we'll see from now on is Microsoft Windows (branded) pop-up warning dialogs.

"My settings have changed and I can't change them back to the way they were. . . . Some unwanted software has the ability to change your home page or search page settings. . . ."

Windows SP2, delivered via the Windows Update service, didn't mysteriously and irrevocably change my settings? You can't mistype a URL without getting a plug for MSN search from IE itself, but Microsoft will protect us from anybody *else* that does the same.

"My Web browser contains additional components that I don't remember downloading. . . . Spyware and other unwanted software can add additional toolbars to your Web browser that you don't want or need."

Software I don't remember installing is probably bad? I don't remember installing 90% of the software my family, my IT department, Microsoft, and I deliberately installed on my computer. I can't install a new printer without getting a slew of new software I don't need or understand installed along with the driver. My new Canon color printer stuck a Canon Easy-Print toolbar in my browser and 10 new applications on my system. According to Microsoft, that means Canon might be spyware. Why should I have to remember the software I install anyway—isn't that something the OS should be able to do?

"My computer seems sluggish. . . . Spyware and other unwanted software are not necessarily designed to be efficient. The resources these programs use to track your activities and deliver advertisements can slow down your computer and errors in the software can make your computer crash. If you notice a sudden increase in the number of times a certain program crashes, or if your computer is slower than normal at performing routine tasks, you may have spyware or other unwanted software on your machine."

So buggy, bloated software laced with branded pop-up dialogs *might* be spyware? I think Microsoft bought these guys just to stop them from drawing the next obvious conclusion. The vast majority of functionality most spyware and adware needs to work is provided by the Windows OS and IE in the first place.

If you notice Windows, IE, and Microsoft Word being slower or crashing more than usual, then that's a symptom of it being somebody other than Microsoft's fault. The solution is for you to use the anti-spyware solution that will replace evil spyware pop-ups with Microsoft-branded pop-up warning dialogs, provided to you by the company with the spotless record for protecting consumer privacy and security. I feel safer already. Whatever you do, don't ask any inconvenient questions about who's really at the root of the problems your computer is having. ▲

Whatever you do, don't ask any inconvenient questions about who's really at the root of the problems your computer is having.

Send your feedback to TheSaint@cpumag.com.

DREAM HARDWARE

These Gizmos Don't Sing It, They Bring It

"Bigger, faster, stronger" used to mean strength and agility training back in our high school days, but now it's more apropos of the "Dream Hardware" coming over the transom. Bigger plasma TVs. Faster electric fantasy cars. And stronger, purer amplifiers for our audio core. We may only feel a bicep burn from curling the coffee mug these days, but as far as gadgets go, we're respectably ripped.

by Marty Sems

Eliica

The line continues to blur between electronics and vehicles. Recharge time may always limit electric cars' appeal, but performance is no longer a question. At least we can't question a streetable 800hp, as in the Eliica prototype invented by Hiroshi Shimizu and based at the Electric Vehicle Laboratory of Keio University in Japan. That works out to 100hp per drive wheel. We imagine that drivers for whom four or six wheels just aren't enough know who they are. The Eliica's startling numbers don't stop there. Try a 0-to-60mph time of four seconds and a top speed of 230mph. If the Eliica were to be commercialized, some estimates put it at about $315,000 (www.eliica.com).

Krell Evolution One

We theorize that your stereo system is about to evolve. The new Evolution One is to your cheap, old amplifier what a shinbone is to a space station. Krell says the One keeps bandwidth huge and feedback virtually nil by avoiding unnecessary ampere-voltage conversions. With 450 watts on tap, the top volume setting on this amp might start your genes splitting on their own. The Evolution One costs $45,000 per pair (one for each stereo channel). Meanwhile, a pair of Krell's Evolution Two preamps sells for a mere $35,000. Both monaural Evolutions are Class A units with toroidal transformers, separate power supplies, and sophisticated signal conditioning. Your first step toward *audio superior* is www.krellonline.com.

Samsung Z101

Better knock out a wall before this puppy arrives. It's not that a 102-inch PDP won't fit through your front door, but rather that you'll need some extra distance from it to avoid hours of rubbernecking as you watch TV. Samsung calls it the Z101. Why not Z102? Actually, both names sound like a radio station with an odious Morning Zoo program. Anyway, this plasma screen is a "technology statement," or rather a bit of showing off instead of an actual product model. As such, there's no timeframe of availability or a price—apart from the unofficial, whispered aside of "a jillion dollars." However, the chaebol did tell us to look for its new 80-inch plasma display around July. If we happen to have a spare $60,000 by then, we'll do just that. ▲

SLI Motherboard & Video Card Roundup

It Doesn't Get Any Faster Than This

Ever driven down a long, straight, and otherwise boring road at night? After a couple hours of piloting along under cruise control, you're gripped by the urge to floor it, to hear your engine scream, and watch the dashed lane divider blur into a solid line. You up-shift into fourth gear for extra acceleration and wind out through redline. Fifth gear is a flick of the wrist, buying you another 1,000 rotations. As you top out, you wish there were a little something extra-nitrous, another gear, anything to keep the adrenaline flowing and the speedometer moving.

NVIDIA's SLI (Scalable Link Interface) multirendering technology is that something extra; it's the instant gratification of adding another graphics card to your obscenely fast gaming machine, and realizing 50% or 60% more frames per second. It's the slap-on supercharger that takes a Camaro from American muscle to drag-strip menace. But building an SLI rig isn't as easy as buying another GeForce 6800. It involves a special motherboard, a particular combination of graphics cards, and a power supply with enough oomph to drive each demanding puzzle piece. Stray from the chosen path in any category, and you may wind up with an expensive pile of idle silicon rather than the stuff gaming dreams are made of.

All the motherboards and graphics cards in this roundup are certified by NVIDIA to comply with the SLI specification, so you don't have to worry about buying bum parts. Some are more feature-rich, though, and consequentially may be a bit pricier. Because there's nothing affordable about taking the SLI route, you'll want to pick each piece carefully to stretch your precious dollars. (See our benchmark charts on page 21 for how we tested.)

Motherboards

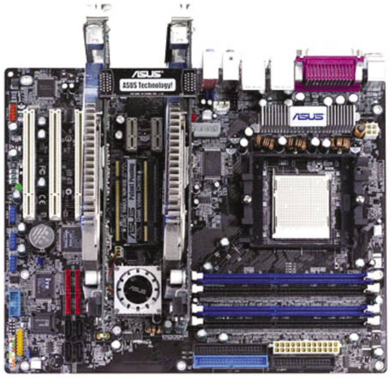
NVIDIA reportedly gave the top tier of motherboard manufacturers first dibs on coveted SLI chipsets. As a result, there are limited boards for sale, all from popular names. DFI, representing the interests of speed junkies, is an exception with its less-conventional SLI-certified board.

ASUS A8N-SLI

ASUS was the first out the door with an SLI motherboard. Although prices were astronomical at first, the A8N-SLI has since stabilized at less than $200. It's not the most lavish contender, though. You won't find the integrated 802.11g wireless, IEEE 1394b, or special Stack Cool features present on ASUS' Intel flagships. Instead, expect such standardized extras as dual GbE (Gigabit Ethernet) controllers; eight-channel, 16-bit audio; IEEE 1394a; and an add-on SATA controller that supports RAID 5 through software.

One characteristic that ASUS is consistent with is board design. The Socket 939 processor interface has plenty of room around it to accommodate large heatsinks. Power circuitry is covered by a passive cooler, keeping noise to a minimum, and memory slots are spread far enough apart to support Corsair's massive Xpert modules. Apparently, ASUS also had a mind for cooling when it architected the A8N-SLI. Competing platforms place the PCI-E x16 slots close to each other, so that when GeForce 6800 Ultras are installed, they nearly sit flush. The A8N-SLI promotes better airflow with a slightly larger gap between the graphics slots.

Another of ASUS' historically strong points is BIOS implementation. Version 1003 offers lots of flexibility for tuning memory performance, setting various voltages, and choosing frequencies in 1MHz increments. We noticed, however, that specifying significantly higher bus speeds kicks memory performance back significantly without an option to overclock it. So, running a 260MHz bus yields DDR266 memory speeds. The probable solution, defining a memory-speed ceiling in the BIOS, results in automatic configuration of the processor bus and restricted access to the voltage modifications and multiplier switch needed to make the jump.



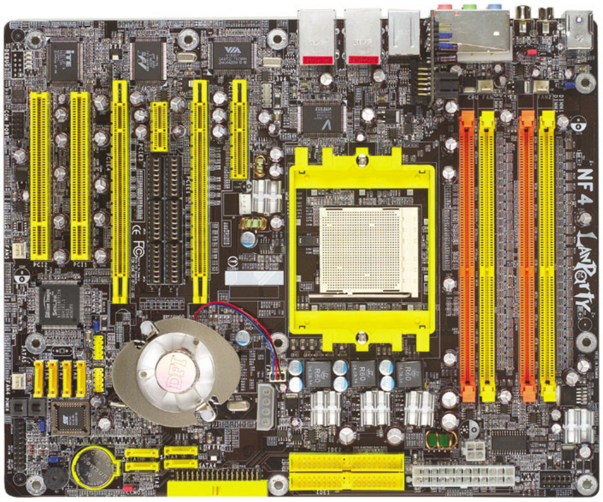
A8N-SLI
$190
ASUS
www.asus.com

Fortunately, the A8N-SLI was the best performing board at default settings, affirming ASUS' efficient design. We noticed some visual artifact issues with

A8N-SLI Specs: Slots: x16 PCI-E (2), x1 PCI-E (2), PCI (3); PATA (2); SATA (8); four fan headers; Audio: Realtek ALC850, six 1/8-inch analog jacks, coax and optical SPDIF; LAN: NVIDIA integrated, Marvell Gigabit

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

ASUS' Extreme 6800 Ultra graphics cards in 3DMark05, though, prompting further investigation. Sure enough, when we used the ASUS board and graphics cards together, core frequency increased to 446MHz (vs. 425MHz stock), and memory jumped from 1.1 to 1.15GHz. Dropping these settings to default improved image quality and retained ASUS' performance advantage.



LANParty nF4 SLI-DR
$225
DFI
www.dfi.com

DFI LANParty nF4 SLI-DR

As the lone tier-two motherboard manufacturer selling SLI motherboards, we expect DFI to strike a value chord with its products. However, limited availability and a surprisingly rich list of features actually combine to inflate the nF4 SLI-DR's price. Fortunately, a compelling list of features supports DFI's asking price.

In addition to its two x16 PCI-E slots, there's also one x4 slot, one x1 slot, and two standard PCI slots. The nForce4 SLI chipset only offers 20 lanes of connectivity, so it's technically not possible to occupy 16 lanes with graphics and the other two peripheral connectors simultaneously. You probably won't need to anyway because DFI builds on NVIDIA's own GbE controller with a second PCI-based Gigabit chip. You'll also find an eight-channel audio codec and a FireWire controller. Finally, an onboard Silicon Image SATA controller means that the nF4 SLI-DR boasts eight ports of connectivity, along with RAID 0, 1, 0+1, and 5.

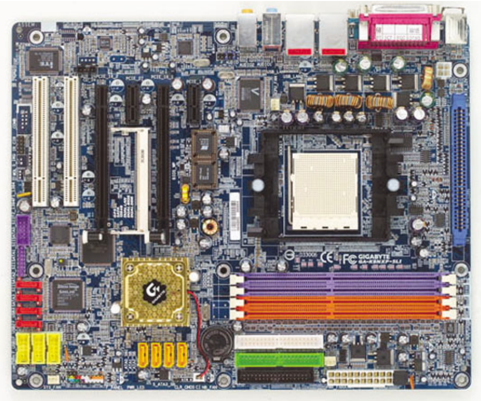
DFI also jazzes up gaming motherboards aesthetically, and that's reflected in a host of UV-reactive accessories, from motherboard plugs and ports to power-supply sleeving and round cables in the box. Even the FRONTX 5.25-inch diagnostic bay has a black bezel to match most LAN boxes. So intent is DFI on the gaming theme, that it even bundles a harness of sorts with mesh pockets. (For the sake of your lower back, here's hoping you have an aluminum chassis and not steel.)

Performance at default settings was on par with the other SLI boards. Why is that such a shocker? According to DFI, it didn't have the official "recipe" for NVIDIA's SLI technology during development, which explains the series of jumper blocks that switch between single- and dual-card modes. All three tier-one manufacturers instead feature a keyed circuit board. Nevertheless, a robust BIOS, strong features, and unwavering stability let DFI show well against the more established competitors.

GIGABYTE K8NXP-SLI

While everyone else was scrambling to get SLI products out, GIGABYTE was thinking outside the box, coming up with an interesting board and graphics card combination: the K8NXP-SLI and 3D1 dual-6600 GT SLI card (reviewed last month, page 25). The 3D1 didn't fare so well, but GIGABYTE's corresponding motherboard is much more likeable.

The board offers the lowest street price here. You might expect cost to weigh heavily on available extras, but the K8NXP-SLI actually wields one of the best feature sets. A Silicon Image chip that adds four more SATA ports, Texas Instruments' IEEE 1394b controller (800Mbps), twin GbE controllers, and a 16-bit, eight-channel audio codec complement the nForce4 SLI chipset. That's not even counting the bundled 802.11g and three-phase add-in power cards.



K8NXP-SLI
$185
GIGABYTE
www.giga-byte.com

K8NXP-SLI Specs: Slots: x16 PCI-E (2), x1 PCI-E (2), PCI (2); PATA (2); SATA (8); three fan headers; Audio: Realtek ALC850, six 1/8-inch analog jacks, coax SPDIF; LAN: NVIDIA integrated and Marvell PCIe Gigabit

nF4 SLI-DR Specs: Slots: x16 PCI-E (2), x4 PCI-E (1), x1 PCI-E (1), PCI (4); PATA (2); SATA(8); four fan headers; Audio: Realtek ALC850, six 1/8-inch analog jacks, coax SPDIF; LAN: NVIDIA integrated, Marvell Gigabit

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

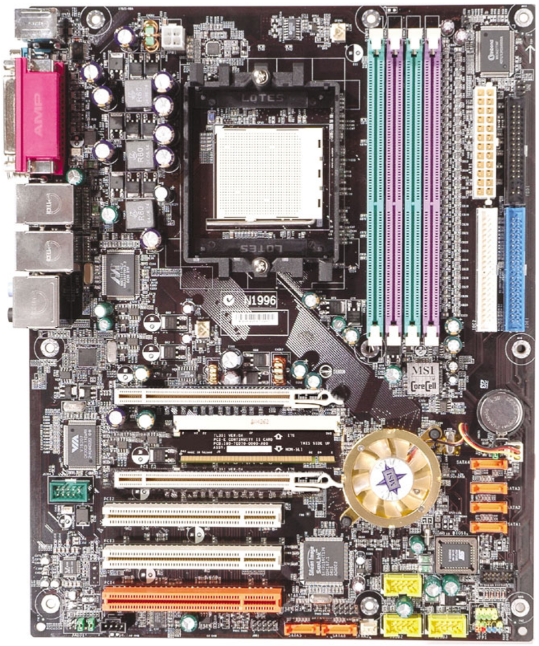
The K8NXP-SLI isn't perfect, though. It officially supports up to 4GB of DDR400 memory across four slots. However, they literally butt up to each other, leaving no room for oversized modules. Two Corsair Pro Series modules fit, but they bow out noticeably, blocking access to the third slot. Moreover, from first glance, the K8NXP-SLI BIOS isn't very thorough. It doesn't provide for memory timing tweaks or HyperTransport link control. But GIGABYTE likes to hide advanced features for some reason, exposing them only after you press CTRL-F1 in the BIOS. The resulting Advanced Chipset Features menu enables lots of timing customization, while the Memory Intelligent Booster exacts vendor-specific optimizations.

Though it turned out to be the slowest performer at stock frequencies, the K8NXP-SLI was the most responsive overclocker here. It readily shot up to a 270MHz bus, later reduced to 260MHz for stability reasons. Even at that lower setting, however, the board yields record-high Doom 3 and Half-Life 2 frame rates. Media encoding and file-compression performance were on par with ASUS' overclocked A8N-SLI, too. Other than a glaring memory slot-placement oversight, GIGABYTE has perhaps the most compelling SLI motherboard available to overclockers.

Extreme N6800 Ultra 256MB
$650
ASUS
www.asus.com

MSI K8N Neo4 Platinum/SLI

Believe it or not, almost a year has passed since SLI was announced, and only now is hardware readily available. MSI is out to show that patience is a virtue with its K8N Neo4 Platinum/SLI. Arguably the most feature-rich board in this roundup, MSI integrated a 24-bit Sound Blaster Live! audio controller, cruising right past competing eight-channel audio codecs. There's also a Silicon Image 3132 SATA host controller, the first single-lane PCI-E device of its kind that adds a pair of SATA II connectors supporting port-multiplier capabilities. Optical audio output, IEEE 1394a, and coaxial output also come standard.



K8N Neo4 Platinum/SLI
$190
MSI
www.msicomputer.com

Because the board already offers the single-lane SATA controller and a Marvell PCI-E GbE chip, MSI outfits it with three standard PCI slots. The only PCI-E slots are for SLI graphics support. Not that you'll miss the connectivity; everything you could possibly dream of is already onboard, except maybe ATI's TV Wonder Elite in PCI-E form. The only questionable design choice would be MSI's SLI card connector. Whereas ASUS and GIGABYTE opted for SODIMM-like connectors, the K8N Neo4 uses a swiveling, somewhat flimsy, piece of plastic.

Priced at less than $200, MSI's SLI solution offers integrated hardware components that even gamers will want to leave enabled. Although the board's overclocking performance leaves a lot to be desired, it can keep up with ASUS' A8N-SLI at default speeds, making it one of the fastest and most affordable motherboards available.

K8N Neo4 Platinum/SLI Specs: Slots: x16 PCI-E (2), PCI (3); PATA (2); SATA (6); four fan headers; Audio: Sound Blaster Live!, five 1/8-inch analog jacks, coax and optical SPDIF; LAN: NVIDIA integrated and Marvell PCIe Gigabit

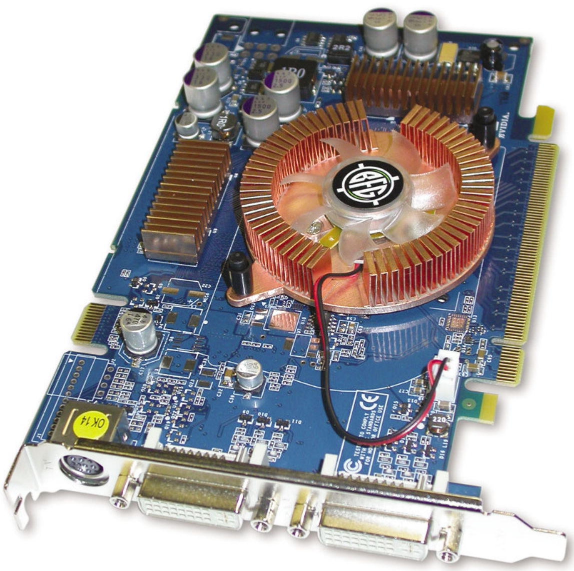
Graphics Cards

Motherboards are only half the SLI equation; graphics horsepower determines your system's top speed. Picking the right combination can be difficult, though. On one hand, a pair of 6800 GTs might sound like the perfect compromise between price and performance; but if cost is an issue, two 6600 GTs might be more reasonable. What's a power-hungry gamer to do? You can start by saving your pennies.

ASUS Extreme N6800 Ultra 256MB

Months after NVIDIA introduced its PCI-E NV45 graphics processor, high-end 6800 Ultra cards are still ridiculously rare. Those that do exist are generally

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect



GeForce 6600 GT OC
$250
BFG Technologies
www.bfgtech.com
CPU CPU CPU C

expensive. What does a gaming enthusiast get when he ponies up for a pair of Ultras? To begin, the NV45 GPU runs at 425MHz by default (25MHz faster than the AGP version), while memory cruises along at 1.1GHz.

Although ASUS reportedly had plans to release a single-slot Ultra card, its N6800 Ultra adheres to NVIDIA's reference dual-slot design. We're not complaining. After all, the four SLI-certified motherboards easily accommodate the larger model without issue, and at no point was stability a problem in our testing, due to heat. Granted, the cylindrical fan generates significant noise during intense gameplay, but it's less intrusive while idling.

Performance is naturally awe-inspiring. Two 6800 Ultras running in tandem plow through the latest games at 1,600 x 1,200 with antialiasing and anisotropic filtering cranked, barely breaking a sweat. Try running anything slower than an Athlon 64 3800+ and you'll witness processor bottlenecks up to the highest resolutions. Moreover, breaking 10000 in 3DMark05 should be little challenge with a modest bit of platform and graphics overclocking.

Without any distinctive hardware features, ASUS does its best to make the Extreme N6800 Ultra stand out. You get the full version of Doom 3, Joint Operations: Typhoon Rising, ASUSDVD, PowerDirector 3DE, and Medi@Show SE. A USB Web cam, two DVI-to-VGA adapters, a composite cable, and power adapter round out the bundle.

BFG GeForce 6600 GT OC

The need for speed has always driven BFG to run its operation a little differently. Competing makers eagerly adopt and resell cards based on NVIDIA's reference design, or in some cases, make cooling modifications. But BFG goes a step further, actually guaranteeing its products for life at accelerated frequencies (525MHz/1.05GHz). And while most other 6600 GTs feature one DVI and one VGA output, BFG goes all out with dual-DVI, plus an HDTV connector that enables component video. Custom copper cooling illuminated by blue LEDs gives the board added flair.

Truth be told, an extra 25MHz doesn't do much for this card's performance. The extra frequency does suggest a proclivity for overclocking, though. It turns out that the 570MHz core and 1.15GHz memory clocks seemed to generate the best performance results without introducing any visual anomalies, earning 6428 3DMarks and 31.5fps in Doom 3 at 1,600 x 1,200 4XAA/8XAF.

BFG charges a slight premium for the 6600 GT OC, which retails at $250. It'd be prudent to instead consider the benefits of BFG's 6800 GT OC, an overclocked 6800 GT that sells for less than a pair of 6600 GT cards, and in most cases, offers better performance.

Chaintech SE6600G

Available at less than $200 per board, Chaintech's SE6600G is by far the most affordable way to get into SLI. It runs at NVIDIA's reference speeds of 500MHz/1GHz, offers dual-display support, and comes with an HDTV adapter that boasts component video output. Chaintech even bundles a full installation of Painkiller. We really should have been looking at a value champion here.

Unfortunately, the cards suffered from performance anxiety. Doom 3 runs flawlessly, but any other benchmark triggers NVIDIA's auto-protection mode, which reduces clock speed in response to a perceived lack of power delivery. Every motherboard yielded the same results, making Chaintech's cards fundamentally unusable.

We were naturally curious. After some comparison checking, we determined that a few components on the purportedly reference SE6600G were missing. Smoking gun or false alarm, it's unclear whether

SE6600G
$190
Chaintech
www.chaintechusa.com
CPU

WinFast PX6800 GT TDH
$450
Leadtek
www.leadtek.com
CPU CPU CPU CPU

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

XFX GeForce 6800 GT PCI-E 256MB
$425
PINE Group
www.xfxforce.com

those missing capacitors and resistors could cause such general instability.

Leadtek WinFast PX6800 GT TDH

Most vendors selling GeForce 6-series cards have stuck to NVIDIA's reference design, and with good reason. Leadtek strays the most of any maker with its WinFast PX6800 GT TDH, a GeForce 6800 GT built more like a super-sized Ultra board.

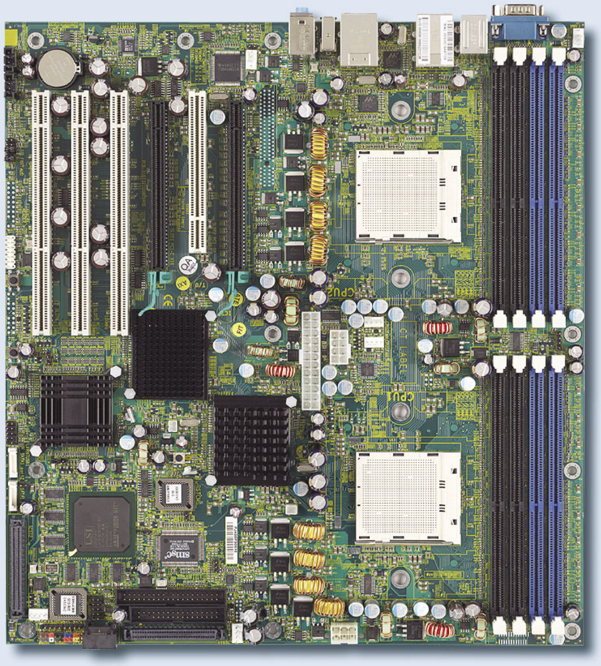
Where most other 6800 GTs fit in one slot, the WinFast card uses a dual-slot design. The GPU is covered by a large copper plate. An aluminum heatsink is soldered directly over this, flanked by a copper heat pipe, to which large copper fins are attached. A smoked, plastic cover sits on top of Leadtek's cooling apparatus, housing a filtered 60mm fan and encouraging airflow over the copper fin arrays. Another copper heatsink also covers power circuitry on the card's extravagant front side. Flip the card over and

SLI Hits The Workstation World

Thought SLI was a gaming innovation? It is, but not exclusively. Today's workstation graphics are very much derived from desktop architectures, and many technologies effectively serve both markets. NVIDIA's SLI is perfectly suited for the demanding world of fast-paced gaming and professional workstation applications. The problem is that a majority of SLI motherboards specifically target gamers with vast SATA connectivity and multichannel audio codecs. Graphics workstations require a different set of specs.

Who better to deliver those capabilities than Tyan, which has experience in the gaming and professional markets? Tyan recently introduced its Thunder K8WE motherboard, which reminds us why we love hardware so much. NVIDIA's nForce Professional 2200 and 2050 both populate the board, enabling an incredible 40 lanes of PCI-E connectivity. Only 32 are actually exposed, though, through a pair of x16 slots that run at full speed, even in SLI mode.

If two graphics cards weren't enough, the Thunder hits hard with a pair of Opteron 200-series processors running at up to 2.6GHz. Each is mated to four memory slots that work with up to 16GB of DDR400 modules, and the list goes on. Dual GbE, SATA II, integrated Ultra320 SCSI, FireWire, eight USB 2.0 ports, independent 64-bit PCI-X buses, and integrated audio all contribute to the board's magnetic personality (and nearly $600 price tag). Just remember that you'll need a PSU with a 24-pin connector and 8-pin auxiliary plug, a 6-pin SSI workstation plug, and two 6-pin graphics power connectors. No, your ATX 2.x unit doesn't have enough juice to get this thing to boot. ▲



CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

What's The Difference?

So you've decided SLI is overkill, but you still want to stay modern with PCI-E graphics. NVIDIA has spun off two other versions of the chipset family that it positions against VIA's competing K8T890: the nForce4 Ultra and vanilla nForce4. The first is designed for high-end apps that only require one graphics adapter; the other aims to push AMD64 and PCI-E into mainstream environments.

In essence, nForce4 Ultra supports the same features as nForce4 SLI, except for the configurable PCI-E pipeline. The two models share SATA at 3Gbps, NVIDIA RAID, ActiveArmor, and integrated GbE. Just how similar are they? Rumor has it that you may decouple the x16 PCI-E slot by connecting two points on an Ultra chipset, yielding an SLI chipset. Of course, such a mod would only be relevant on a dual-slot motherboard, such as DFI's nF4 Ultra-D, but NVIDIA claims to be taking preventative action against future tweaking.

The standard nForce4 is slightly different. It still enables PCI-E graphics, integrated GbE, and NVIDIA's RAID solution, along with a hardware-optimized firewall, but SATA performance drops from 3Gbps to 1.5Gbps, and the ActiveArmor networking engine is shed. Finally, nTune, NVIDIA's tweaking and monitoring utility, isn't included with the standard nForce4 package; it's mainstream fare, after all, with many boards priced less than $100. ▲

you'll find more copper, this time dissipating heat from under the GPU and BGA memory chips.

As a result, it's important to choose the right SLI board. DFI, GIGABYTE, and MSI all leave one slot worth of space between onboard x16 connectors, whereas ASUS allows two. Thus, the A8N-SLI is the only board that can accept two WinFast PX6800 GT's in an SLI configuration. If you're only using one card, any nForce4 SLI or nForce Ultra board will work fine.

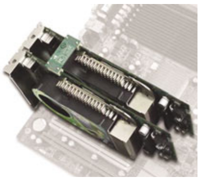
That unconventional form factor is really only worth something if it improves overclocking, right? Specifically, we were looking for 6800 Ultra-class performance given its sheer size. Leadtek didn't disappoint. The card offered 425MHz core and 1.1GHz memory speeds with unflagging stability in a looped iteration of 3DMark05. Interestingly, NVIDIA's CoolBits overclocking utility deemed frequencies above that unstable.

Consider that Leadtek's 6800 GT is currently selling for about $200 less than an ASUS Ultra board. Multiply that number by two, think about the GT's overclocking potential, and reap the benefits in Ultra-like performance for $400 less. We only wish the WinFast PX6800 GT TDH were slimmer. As it stands, ASUS' A8N-SLI is your only option for two of these cards rendering cooperatively.

XFX GeForce 6800 GT PCI-E 256MB

Of the possible SLI combos, two GeForce 6800 GTs offer the most favorable compromise between "your computer rocks" and "you paid how much for that?" Default speeds are fast enough to play the latest games with maximized

SLI Graphics Performance



You might think that products having graduated from NVIDIA's SLI program would certainly be interoperable. Incompatibilities are a fact of life, though. For example, the Leadtek 6800 GT cards only fit on ASUS' A8N-SLI motherboard, while XFX's 6800 GT cards refuse to work with that same motherboard. Despite not needing auxiliary power input, Chaintech's 6600 GT cards failed almost every test we threw at them, giving us an error about insufficient power. Meanwhile, BFG's equivalent worked flawlessly. Thus, we tested all cards on MSI's K8N Neo4 Platinum/SLI except for the Leadtek boards, which were benchmarked on the A8N-SLI.

				3DMark05 v1.2.0		Doom 3		Half-Life 2		Far Cry	
Vendor	Model/Chip	Clock Speed	Max Overclock	1,024 x 768 x 32	1,600 x 1,200 x 32	demo1 1,024 x 768 Ultra	demo1 1,600 x 1,200 4XAA/8XAF	1,024 x 768; Custom demo file	1,600 x 1,200 8XAF; 4XAA/ Custom demo file	1,024 x 768; Custom demo file	1,600 x 1,200 4XAA/8XAF; Custom demo file
ASUS	Extreme N6800 Ultra 256MB	425MHz core; 1.1GHz memory	446MHz core; 1.15GHz memory	9474	6817	105.5	71.6	88.4	68	103.4	75.4
BFG	GeForce 6600 GT OC	525MHz core; 1.05GHz memory	570MHz core; 1.15GHz memory	5872	3472	100.4	29.1	78.7	26	59.7	31.6
Chaintech	SE6600G	500MHz core; 1GHz memory	NA NA	Failed	Failed	100	28.7	Failed	Failed	Failed	Failed
Leadtek	WinFast PX6800 GT TDH	350MHz core; 1GHz memory	425MHz core; 1.1GHz memory	8480	5905	105.6	64.4	89.7	60.3	103.4	66.1
XFX	GeForce 6800 GT PCI-E 256MB	350MHz core; 1GHz memory	410MHz core; 1GHz memory	8290	5838	105.8	63.9	88.5	60.3	102.5	65.2

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

settings, and overclocked performance generally rivals the GeForce 6800 Ultra.

XFX's solution is simplicity. The plainly named GeForce 6800 GT PCI-E follows NVIDIA's reference specification to a T, cooling included. It's a single-card design with one S-Video and two DVI outputs. The 16-pipe NV45 core runs at 350MHz, while 256MB of GDDR-3 memory cruises along at 1GHz. Performance is consequentially very good, and there's even some overclocking headroom thanks to an efficient aluminum heatsink.

The card bundles X2—The Threat, Commandos 3, and NASCAR Thunder 2004—a diverse array with mainstream appeal. XFX also gives you two DVI adapters, an S-Video cable, and a couple of user manuals. That is a fairly respectable package, considering that XFX sells perhaps the least expensive 6800 GT. Our only concern is an incompatibility that caused system instability with ASUS' A8N-SLI, which consistently resulted in a hard lock about 30 seconds after Windows would load. The XFX 6800 GT worked perfectly with the other three SLI boards. ▲

by Chris Angelini

PC Power & Cooling's Turbo-Cool 510 SLI

The rules of SLI certification aren't so hard and fast when it comes to PSU compatibility. NVIDIA's technical documentation concedes that there are many possible configurations, depending on the graphics cards and peripherals you're running. As a point of reference, however, a GeForce 6600 GT SLI system is best off with at least 350W of power. Bump that to 420W if you buy GeForce 6800 or 6800 GT cards. A pair of GeForce 6800 Ultras warrants no less than 550W.

Plenty of PSUs fit those constraints, but few combine ample juice with the connectivity features needed to interface with two graphics cards and the latest generation of 24-pin ATX plugs. PC Power & Cooling's Turbo-Cool 510 SLI is the exception. In addition to its two 6-pin auxiliary connectors, it offers six SATA plugs, eight 4-pin plugs, a standard 12V connector, and a 24-pin ATX plug that works with 20-pin mobos through a bundled adapter; all in accordance with the newer ATX 2.03 specification.

If you're worried about the unit's 510W rating, don't be. Doug Dodson, CEO of PC Power & Cooling, says, "Our power supplies are tested and rated at 50 degrees Celsius, a realistic temperature inside your chassis. At temperatures lower than that, we're even more efficient." Enermax uses 25 degrees C as its benchmark for rating the power output of many products. When you put one of those PSUs in a stuffy 40-degree case, actual output drops close to 30%. So, while it may look weaker on paper, the Turbo-Cool 510 SLI theoretically delivers better performance. Granted, it's hard to quantify the comparison without load testing, but the 510 SLI gracefully handled all our benchmarks, including the ASUS GeForce 6800 Ultra SLI configuration. ▲

SLI Motherboard Performance

To generate the fairest scores possible, we used the same memory timings on each board, along with the same PC Power & Cooling Turbo-Cool PSU and GeForce 6800 Ultra graphics cards (nForce4 driver 6.39 and graphics driver 67.66). We caught the ASUS and MSI boards trying to set artificially high graphics-card clock speeds, which we corrected through NVIDIA's CoolBits Registry hack. (Those were still the two fastest boards.)

			3DMark05 v1.2.0	Doom 3	Half-Life 2	PCMark04 v1.3.0				WM Encoder 9	WinZip
Vendor	Model	Bus Speed/ Overclocked	1,024 x 768 x 32	demo1 8x6 Ultra	1,024 x 768; Custom demo file	System	CPU	Memory	HDD	165MB AVI at DVD and CD VBR	200MB folder
ASUS	A8N-SLI	200MHz;	9526	105.5	86.3	4608	4491	Crash	5610	5:23	1:21
	216MHz (x12)	9664	108.4	88.6	4771	4798	Crash	5578	5:03	1:04	
DFI	nF4 SLI-DR	200MHz;	9451	101	81.8	4506	4424	5402	5597	5:28	1:26
	235MHz (x10)	9476	104.7	84	4499	4371	5814	5606	5:31	1:25	
GIGABYTE	K8NXP-SLI	200MHz;	9275	97.6	79.2	4480	4458	4713	5629	5:28	1:27
	260MHz (x10)	9818	111.4	91.3	4884	4768	5618	5601	5:04	1:03	
MSI	K8N Neo4 Platinum/SLI	200MHz;	9543	105.1	88.9	4602	4510	5023	5569	5:24	1:25
	210MHz (x11.5)	9560	106.5	89.3	4633	4533	5549	5596	5:20	1:20	

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Denon's philosophy is simple.

Either
you're
innovating
or
you're
imitating.

Introducing Denon's New AVR-5805

The World's First 10-channel A/V Receiver With Fully Configurable 4-zone Capabilities

A Breakthrough In Multi-source, Multi-zone Flexibility

For the home entertainment enthusiast and custom installer alike, Denon's new AVR-5805 delivers unprecedented four-zone home entertainment integration and control — all from a single component. With 10 configurable and discrete amplifiers, 16-channels of audio output, and the world's first-ever ability to drive two fully independent 5.1 systems, the AVR-5805 will also route audio and video signals from up to four independent sources and distribute them to up to four separate zones throughout the home. Its advanced capabilities even allow discrete power, source selection and volume control of each zone. And flexibility is just the beginning. Read on.

Masterful Technologies And A "Sweet Spot" For Every Listener

Behind the AVR-5805's newly designed, easy-to-read front panel display is a profusion of powerful technologies. An Equal Power amplifier section delivers a massive 170 watts of high-current power into each of its ten channels, processing for every popular 7.1-, 6.1- and 5.1-channel surround sound format — from Dolby (including Pro Logic IIx) and dts, to THX Ultra2 and THX Surround EX. The AVR-5805 also introduces the latest in Auto Setup Calibration and Equalization with the Audyssey MultEQ_{XT} system, tailoring sound not only to the listening environment but also to the audience. This advanced technology analyzes and calibrates six critical settings including variable crossover point detection. It also determines the correct frequency response for up to six separate listener positions and then averages all six. The result? Literally a "sweet spot" for every listener in the room.

d-tools AMX CERTIFIED CRESTRON Integrated Partner

DENON ELECTRONICS (USA) LLC • 19 CHAPIN ROAD, PINE BROOK, NJ 07058-9777 • 973-396-0810 • www.usa.denon.com
DENON CANADA • 505 APPLECREEK BOULEVARD, MARKHAM, ONTARIO, CANADA L3R-5B1 • 905-475-4085 • www.denon.ca

Visit your authorized Denon dealer to experience the entire Denon product line for yourself. Download product information (including the owner's manual) at www.usa.denon.com

This is innovation.

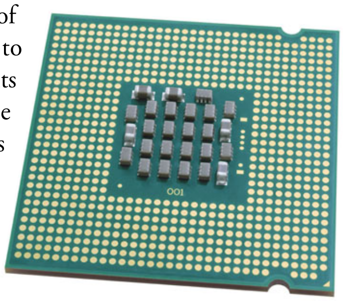
Advanced Video Conversion And Denon's Exclusive Circuitry
The AVR-5805 offers a full complement of advanced processing capabilities like HDMI/DVI digital video selection, video up-scaling (including Faroudja DCDi technology for analog sources) and the world's first dual, independent video conversion for unmatched simplicity and the highest picture quality from all your video gear. For even greater A/V performance, it employs the most advanced Texas Instruments' and Analog Devices' 32-bit DSP processors, Burr-Brown 24-bit/192kHz audio DACs, as well as Denon's newly improved DDSC-D (Dynamic Discrete Surround Decoder-Digital). And to top it off, exclusive Advanced AL24 Processing Plus circuitry maximizes all source signals so that the high-resolution DA converters work at peak capacity.

More Connection Options Than Any Receiver In The Industry
In addition to an extensive complement of digital and analog A/V connections, the AVR-5805 includes a full array of "custom installation" features: assignable high amperage DC trigger outputs, dual RS-232C ports to facilitate integrated system and PC connectivity, and a built-in Ethernet port that adds more system control as well as future updates and upgrades. In-demand connection options include 6 high-bandwidth (100 MHz,) HDTV-compatible component video inputs, HD switching for 2 zones and much more. Finally, the latest version of Denon Link 3 and dual IEEE-1394 inputs allow for reception of high-resolution, multi-channel digital audio data directly from compatibly equipped DVD players. It all adds up to total flexibility and the ultimate level of sonic performance. Denon does it again.

DENON
The First Name in Digital Audio

Intel P4 3.6GHz (660) 64-bit & P4 3.73GHz Extreme Edition

2004 was a poor year for Intel in terms of the high-end enthusiast market. The Athlon 64 continued to stretch its performance lead, and it seemed Prescott did little to counter that. Obviously, Intel wasn't going to chuck out the P4 core and start over. Instead, the company hammered away and came up with an updated Prescott core (dubbed the 2M) and will be releasing a full lineup of Pentium 4 6xx processors. We'll take a specific look at the 660. Also on tap is a new Extreme Edition CPU, the 3.73GHz, targeted at gamers.



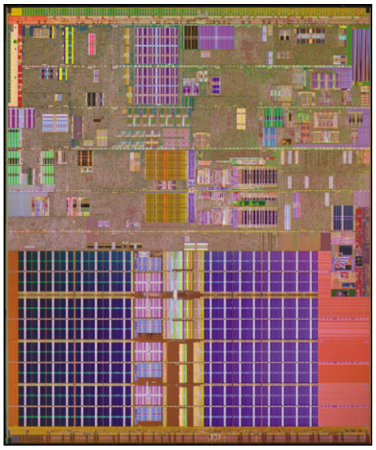
This new core sports a bump-up in L2 cache from 1 to 2MB, which is no mean feat. This is where Intel hopes to grab back some of the losses in benchmarks to the Athlon 64. The benefits of more onboard L2 cache bear fruit in applications and games where the CPU can avoid accessing slower main memory. This isn't "free," and Intel had to up the die-size from 122 to 135mm^2 in order to host some 169 million transistors. (The original Prescott core had 125 million.) The actual chip size isn't all that large thanks to the fact that the manufacturing process is at the 90nm level.

Another nifty feature of the new core is the Enhanced SpeedStep technology, which carries over from the company's mobile Pentium processors. Whilst dynamically scaling CPU clock speeds and voltage in relation to load/usage might not seem important to you, the individual user, think about a large-scale IT company running thousands of P4 6xx PCs at night in idle mode instead of at full pelt.

Also new to the core is Intel's Execute Disable Bit, which helps to diffuse the risk of specific types of hacking, such as buffer overflows that can allow worms and viruses to propagate across a network. Brought over from the Itanium, the Execute Disable Bit lets the CPU specifically designate areas in system memory where code is able to run and where it is not.

Although 64-bit computing has taken way longer to materialize than AMD probably would have hoped for, Intel probably feels now is the time to bestow its high-end lineup with the ability to go beyond that 32-bit 4GB of memory address limitation. Intel's 64-bit extensions are dubbed EM64T, and both the P4 6xx line and P4 3.73GHz EE processors will henceforth be 64-bit capable. Intel seems to be following AMD's lead here.

Other than frequency, there is one major difference between the P4 6xx and Extreme Edition: the bus speed. The Extreme Edition is the only processor to get a swanky 1,066MHz FSB, the 600 stay put on 800MHz, not that you'd be missing it much for the $300 price premium.



Furthermore, if you thought the 500J series of P4s was going to disappear, you'd be wrong, as Intel intends to sell the 600 series alongside it. So, when looking at the less expensive but higher-clocked 3.4GHz 540J in comparison to the higher-priced but lower-clocked 3GHz 630, just remember that the less expensive one has EM64T and SpeedStep support. We're not sure what Uncle Albert is supposed to think, but we're confused, that's for sure.

Confused or not, having spent some time with the new processors and subsequently putting them through their paces, it's pretty clear to us that Intel has really made some positive strides here. Performance is up across the board and some new features are added, and we like that. Although the performance for gamers isn't quite at the level of the Athlon 64, the pricing is pretty competitive for the 600 series. The 3.73GHz EE is a bit of a nonstarter, however. For the $999 price you get a CPU that an Athlon 64 can literally out-play for less than a third of the price, and it isn't really any quicker than the older 3.46GHz EE either. ▲

by Alex "Sharky" Ross

The Digits

Here's a quick take on benchmark numbers.

	SysMark 2K4 OfficeProd.	SysMark 2K4 InternetCC	3DMark05	Doom 3	UT2004
P4 3.73GHz EE	186	245	4682	92	67
P4 660	180	240	4668	89	66
P4 3.46Ghz EE	178	228	4620	91	62
Athlon 64 FX-55	169	229	4661	103	80
Athlon 64 400	160	214	4595	101	75

Specs: 90 nm, 2MB L2 cache, 64-bit extensions

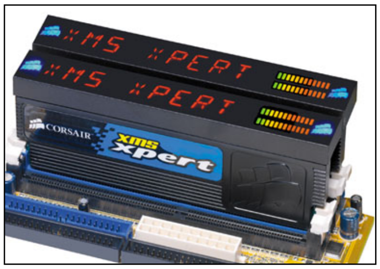
P4 3.6GHz (660) & 3.73GHz EE
$605, P4 3.6GHz (660); $999, 3.37GHz EE
Intel
(800) 538-3373
www.intel.com

P4 3.6Gz (660) ●●●●
3.73GHz EE ●●◐

CPU Ranking: ○ 0 = Absolutely Worthless ●●◐ 2.5 = Absolutely Average ●●●●● 5 = Absolutely Perfect

Corsair Xpert DDR400 Memory

TwinXP1024-3200XL 1GB Memory Kit
$390
Corsair Memory
(510) 657-8747
www.corsairmemory.com



When Corsair first announced its Pro series modules with LED activity-indicator lights, many viewed the innovation as an exorbitant luxury. However, it was soon clear how useful they were in troubleshooting failed overclocking attempts and adding pizzazz to boring memory-module components. The Corsair Xpert family promises to, again, set the bar for visual appeal and diagnostic guidance, albeit at a very high-end price.

Of course, Corsair knows that nobody will spend top dollar on sub-par speed, so the Xpert modules prioritize performance. The 1GB 3200 low-latency kit runs at DDR400 speeds with timings as low as 2-2-2-5, requiring 2.75V.

But the price isn't related solely to performance. The kicker is Corsair's new marquee display, which sits atop the actual module, oriented in one of two different ways. It works with onboard voltage, frequency, and temperature sensors to relay relevant readings across a 10-digit alphanumeric display in real time. Don't worry about losing the Pro-series activity readout because a miniaturized 12-level indicator next to the marquee serves the same purpose.

In addition to those standard stats, Corsair's Memory Dashboard software facilitates up to three custom messages that scroll across the marquee at variable speeds. It also lets you set decimal precision and organize message order on a per-module basis. Naturally, a windowed case is almost a necessity with the Xpert kit constantly outputting useful information, though you can measure the same parameters with Corsair's custom software.

In addition to the price, keep in mind that these modules are particularly large and won't fit well in every-single motherboard. Because the memory slots on GIGABYTE's K8NXP-SLI butt up to each other, for instance, the LED readout screens won't fit next to each other. The same holds true for MSI's K8N Neo4 Platinum/SLI. ASUS' A8N-SLI, on the other hand, works without issue. Properly installed, each display marquee is 0.8 inches wide, so consider measuring before taking the plunge. ▲

Specs: 10-digit alphanumeric display, voltage, frequency, and temperature sensors, custom scrolling marquee, 2-2-2-5 timing at DDR400 speeds

by Chris Angelini

VIA PT-Series Chipsets

PT880 Pro and PT894
VIA
(510) 683-3300
www.via.com.tw

First Look
PREVIEW

Three new PT-series chipsets seem to reflect VIA's best efforts to top Intel's 900-series chipsets. All are reportedly ready for prime-time action but probably won't emerge simultaneously. The PT880 Pro—VIA's mainstream hopeful—will be first out of the gate, offering PCI Express and AGP 8X graphics connectors in addition to comprehensive DDR and DDR2 memory support.

Hardware enthusiasts are more likely to adopt VIA's PT894, a complete PCI-E solution that sheds AGP but maintains support for both generations of DDR memory and most Pentium 4 processors operating on 533 to 1,066MHz buses. Whereas the PT880 Pro northbridge offers four lanes of PCI-E connectivity, PT894 features 16, plus two single-lane links for adding peripherals.

The high-end PT894 Pro northbridge is nearly identical, but it only comes with 20 PCI-E lanes divided into one x16 link and one x4 link, both connected to x16 slots. Also, VIA presents its DualGFX feature as a means to enable three or four display outputs with a second video card.

But the key to VIA's success doesn't necessarily rest with these three new northbridges. Rather, the VT8251 southbridge will determine how aggressively VIA competes against Intel's more advanced feature set. The existing VT8237 chip is already more than a year old, and it's quickly falling behind. To be fair, VIA's reference PT894 platform does include the latest southbridge with high-def audio, SATA II, and two additional lanes of PCI-E. However, VIA lists the final product as forthcoming, suggesting delays. Without VT8251, the PT880 Pro will likely be popular amongst the budget-sensitive crowd. But, with NVIDIA's rumored entry into the Pentium 4 market imminent, VIA needs that southbridge to stave off vicious competition. ▲

Specs: PT880 Pro: LGA775 P4 up to 1,066MHz bus, DDR and DDR2 memory up to 667MHz, DualGFX AGP and PCI-E graphics, 2 SATA 150Mbps through VT8237 southbridge. PT894: LGA775 P4 up to 1,066MHz bus, DDR and DDR2 memory up to 667MHz, PCI-E x16 graphics, 2 SATA 150Mbps through VT8237 southbridge

by Chris Angelini

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

SilverStone LC10M

Lascala 10M (LC10M)
$230
SilverStone
(909) 605-1023
www.silverstonetek.com
CPU CPU CPU

Our quest for the perfect HTPC case takes us to SilverStone's LC10M, which is a full-sized ATX/micro-ATX chassis, built thick and solid, with a muted, aesthetically pleasing fascia. The front bezel is brushed aluminum, while the rest is steel.

SilverStone's choice to recess four USB ports in the lower right of the fascia while recessing the audio and FireWire ports just out of sight along the left edge is perfect. The optical drive implementation is less alluring. The area that looks tall enough for three external 5.25-inch bays only offers a narrow cutaway, just large enough for an ODD tray to slide in and out.

Inside the case, SilverStone provides plenty of component room and makes sure all edges are blunt. There's an 80mm (21dB) fan in the front with two 60mm fans (25dB) in back. Overall, the case is a bit louder than we'd like in an HTPC, and the front fan is hampered by the narrow intake vents around the fascia's edges, not directly in front of the blades. The internal 5.25-inch bay feels like dead space, and we were uncomfortable with how closely the 3.5-inch drive cage packs its drives when fully loaded. SilverStone has the height for air gaps but doesn't implement them.

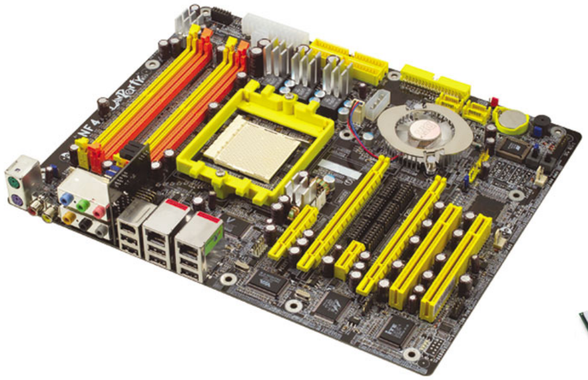
The highlight of this product is the VFD (vacuum fluorescent display) backed by the bundled iMON Multi-Median software and IR remote. The VFD can act as a spectrum analyzer, weather reporter, clock, and even email alerter. Although it's no MCE or SnapStream, the Windows-based UI takes a stab at being a media center interface.

This is still one of the best ATX HTPC cases on the market, but it has several shortcomings, including the lack of toolless features. We hear from multiple vendors, though, that midyear should bring plenty of positive surprises in this space. ▲

Specs: Form factor: ATX, micro ATX; drives: 1 5.25-inch ext., 1 x 5.25-inch int., 4 3.5-inch int.; ports: 4 USB, 1 1394a, 1 headphone, 1 mic; dimensions: 6.4 inches high x 16.9 inches wide x 16.9 inches deep; weight: 17.6 pounds

by William Van Winkle

DFI NF4 Ultra-D



NF4 Ultra-D
$149
DFI
(510) 247-8000
www.dfi.com.tw
CPU CPU CPU CPU

The DFI NF4 Ultra is almost identical to the NF4 SLI, save only in chipset and RAID features. The DFI party line says that the NF4 Ultra-D doesn't support SLI—the board's twin x16 slots exist to run quad-head video output. Do your Googling, though, and you'll find that the mod necessary to enable SLI via the NF4 Ultra-D's twin x16 PCI Express slots takes about two minutes and dodges NVIDIA's driver tweaks to thwart other pseudo-SLI implementations. However, NVIDIA is working to change the Ultra design and thwart this mod approach in the future, including on future versions of the NF4 Ultra-D.

Benchmark scores fall in line across the board with the other nForce4 Ultra boards we've reviewed, trailing slightly in PCMark04 but blazing in Windows Media Encoder 9. Game performance is on par with competitors. This model lacks the Sil3114 and additional four SATA ports found on the -DR model, but you still get integrated coax SPDIF in and out ports, DFI's favored Karajan plug-in 7.1 audio module, dual Gigabit LAN, NVRAID across four SATA ports (up to 3Gbps) and two PATA connectors, and more.

I dig DFI's little touches, such as the power and reset buttons on the board and the color-coded overlay for the I/O shield. Moreover, DFI went insane with its BIOS-based overclocking controls, especially for voltages and RAM timings, and I'd even say that ATI's X200 reference board now has some catching up to do on the OC front. Yellow isn't our favorite color for board slots and rounded cabling, but that's just personal.

I had one small technical hiccup. When we first brought up the system after activating Windows, it went through a series of several hard resets. Then, strangely, it stabilized and stayed stable for the remaining three days it ran on the bench. DFI commented that similar oddities have been reported by others using Corsair TwinX512-3200XL 2-2-2-5, and the matter is under investigation. ▲

Specs: Slots: 2 x16 PCI-E, 1 x4 PCI-E, 1 x1 PCI-E, 2 PCI; PATA: 2; SATA: 4; Fan headers: 5 3x1; Audio: Realtek ALC850, 6 1/8-inch analog jacks, coax in/out SPDIF; LAN Marvell PCI and NVIDIA GbE

by William Van Winkle

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Velocity Micro Anatomy

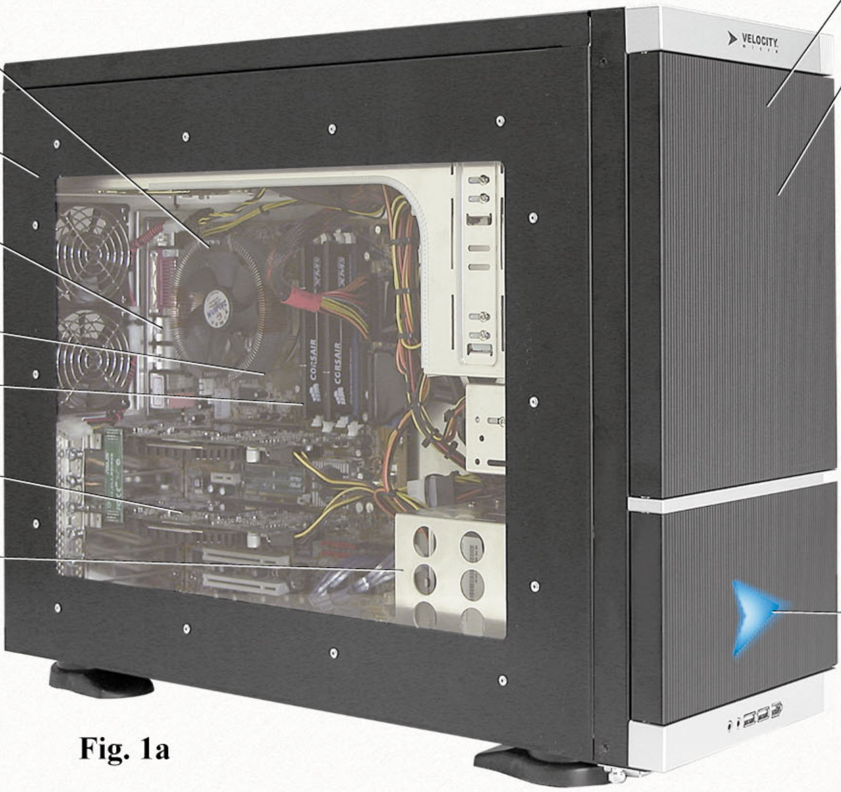

Zalman® Certified High Performance Heatsink/Fan
Velocity Micro LX signature case with front USB 2.0
Asus® A8N SLI Deluxe NVIDIA nForce™ 4 Motherboard
AMD® Athlon™ 64 FX-55
1024MB Mushkin PC3200 DDR400 RAM
2 x 128MB eVGA™ nVidia® GeForce™ 6600 GT in SLI™
2x120GB Western Digital 7,200rpm SATA, 8MB Cache
3 Year Warranty with 1 year 24/7 & On-Site Support
16x/48x Lite-On® Black DVD±RW
52x/32x/52x Lite On® Black CD-RW
Black 1.44MB/ Media reader
10/100/1000MBps Integrated Ethernet
Microsoft® Windows® XP Home w/SP 2 and CD
Black Microsoft® Multimedia Keyboard
Black Microsoft® Explorer Optical USB Scroll Mouse
Air Intake
VELOCITY

Fig. 1a

$2785

Fig. 1b

Fig. 1c

Fig. 1d

Gamer's Edge™ DualX™

Assignment:

1. Visit **velocitymicro.com** to learn more about award winning, ultra performance PCs.

2. Configure yours today. Systems starting at $1000.

3. Call 800-303-7866 to speak with sales and support staff.

NVIDIA SLI™

We know what makes a great PC.

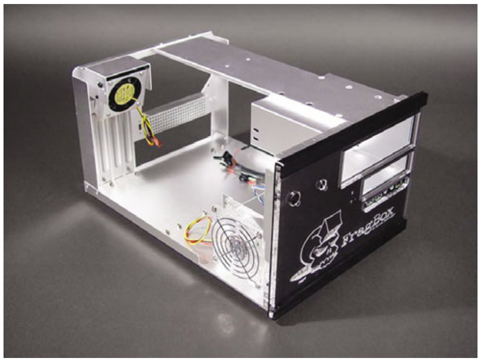
Velocity Micro custom built, ultra performance systems are more than just the sum of their parts. Over 25 Editors' Choice awards prove that we know what makes a great PC:

- Meticulous build process by hard core tech geeks
- High end retail components
- Precision tuning and testing to extract the highest performance
- 24/7 technical support from technicians who graduated from the production floor

VELOCITY™ micro

© 2005 Velocity Micro Inc., Richmond, VA. Velocity Micro, Gamer's Edge, and DualX are trademarks of Velocity Micro, Inc. All other trademarks are the property of their respective owners and hereby acknowledged. ©2005 NVIDIA Corporation. The name NVIDIA, SLI, the NVIDIA logo, and the SLI logo are registered trademarks of the NVIDIA Corporation. All rights reserved. Configurations and prices may vary on website.

Falcon Northwest FragBox 2 Chassis



FragBox 2 & FragBox Power Supply
$299, chassis; $125, 520W power supply
Falcon Northwest
(888) 325-2661
www.falcon-nw.com
CPU CPU CPU CPU

The Falcon Northwest FragBox 2 is renowned as a compact, powerful gaming system. Its intended audience has no budget, and everyone else must be content to drool over it. Well, slaver no longer—Falcon is offering the FragBox 2 chassis as a standalone product.

From the outside, the FragBox 2 looks like a larger version of FIC's old ICE Cube, but it's more attractive with a black, anodized, aluminum housing and clear, acrylic front fascia. The left and right sides boast acrylic windows and etched ventilation holes. A bundled cold-cathode light illuminates system innards, complementing the light-up FragBox logo etched onto the faceplate. And it just wouldn't be a FragBox without a built-in handle for toting the chassis to and from LAN events.

In addition, Falcon claims that the box accommodates any micro-ATX motherboard (my Intel D865GLC slid right in). Falcon also boasts that all video cards, dual-slot included, fit, too (I managed to wedge in an AGP 8X GeForce 6800 Ultra). After adding a 20-pin power supply adapter, an Audigy 2 sound card, and redirecting the adjustable peripheral cooling fan, the system fired right up.

At $300, the FragBox 2 chassis is almost ridiculously expensive. Add $125 for the power supply, and you're talking about some serious coin. But if it's a FragBox you're after, how much would it cost to part out a system that matches what Falcon Northwest offers? We estimate an Athlon 64 4000+ FragBox 2 setup built and delivered would cost $3,791, and doing it yourself would be about $2,510. Ultimately, it's a decision between saving a pile of cash or having someone else scrape his knuckles on the inside of your case. As a proponent of value, the FragBox2 chassis is a great way go premium on a budget. ▲

Specs: Fits µATX motherboards, 1 optical drive, 1 floppy drive, and 2 hard drives; 4 back-panel slots for add-in cards; front-panel USB 2.0, IEEE 1394, and audio.

by Chris Angelini

Sony DRU-720A

DRU-720A
$149.99 ($119.99 after rebate)
Sony
(800) 352-7669
(408) 432-1600
www.sonyburners.com
CPU CPU CPU C

The company that pioneered dual DVD±R/RW drives and later DL (double-layer) 8.5GB burners is pressing onward. Sony's new DRU-720A can reach a 16X write rate in both DVD+R and DVD-R, as well as 4X in DVD+R DL. And although it's been historically harder to break new speed records in RW writing, the new Sony drive can reach 8X in DVD+RW and 6X in DVD-RW.

Of course, all of the above depends upon using properly rated media, some of which isn't widely available at this writing. Blank-disc manufacturer Verbatim says most 2.4X DL media should be able to reach 4X, which worked for me. Sony provided some pre-spec 8X DVD+RW and 6X DVD-RW discs for my tests. Unfortunately, the drive's 22:29 (minutes:seconds) 8X DVD+RW and 23:24 6X DVD-RW writes under Nero 6.6.0.6 were slower than most 4X burns I've seen.

My DRU-720A wasn't entirely well-behaved during the rest of my tests, either. It twice failed a read test on a moderately scratched DVD-ROM that other drives could read. Also, like previous Sony DRU-7xx drives, the DRU-720A capped a 32X Verbatim CD-RW at 16X instead of 24X. The surprising part was the Sony's tortoise-like 16X DVD±R burns in the 26-minute vicinity.

Still, the drive's 45:44 DL 4X write was the fastest I've witnessed. And Sony has a reputation for speeding things up via free firmware updates, so don't write off this drive just yet. My test PC had a 754-pin AMD Athlon 64 2800+, 1GB of OCZ Gold DDR400, an Epox EP-8HDA3+ motherboard with VIA's K8T800/8237 chipset, and a Maxtor DiamondMax+9 SATA 7,200rpm/8MB cache hard drive.

The DRU-720A comes with a black disc tray and replacement bezel, plus a Nero 6 software bundle. It has a one-year warranty and toll-free phone tech support for 90 days. ▲

Specs: 16X/8X/16X DVD+RW, 16X/6X/16X DVD-RW, 48X/24X/48X CD-RW, 4X DVD+R DL

by Marty Sems

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Planet Computers HDX700

The "perfect" media center machine could be a svelte, fanless pizza box as easily as it could be a blazing, fan-riddled tower sitting in the basement, depending on your needs. Planet Computers struck a reasonable compromise with its HDX700 by melding sleek looks with solid construction and respectable performance.

That said, I noted some odd inconsistencies in our configuration. Planet made a terrific motherboard choice with the 925XE-based ASUS P5AD2-E Premium, which comes replete with integrated wireless LAN, dual Gigabit, 1394b, and heaps of RAID functionality. However, every CPU offered for the HDX700 is based on an 800MHz FSB, including the P4 530 (3GHz) that shipped with the unit. This, in turn, limited the benefits of the two 512MB Corsair CM2X512-5400C4 (675MHz) modules in our box. The P5AD2-E can run this RAM at 711MHz, but with the P4 530, the highest option available is 600MHz. Given that the only 1,066MHz FSB chip available as of this writing, the Pentium 4 EE 3.46GHz, still sells for over $1,000 (while the boxed P4 530 sells for under $200), Planet's choice is understandable, but the company should still offer the higher-end option.

Planet did opt for SilverStone's ATX, VFD (vacuum fluorescent display)-enabled LC03V chassis, an excellent choice for living rooms where space isn't at a premium. This is a full-sized desktop design with two external 5.25-inch, two external 3.5-inch, and two internal 3.5-inch bays, as well as two quiet 60mm exhaust fans. The power supply is SilverStone's 460W ST46F, which features a single 120mm fan. The LC03V's fans are suitably hushed. The problem is the noise from the graphics card and Intel's reference heatsink fan. Combined with the fact that the case venting is nowhere near the hottest components, forcing the exhaust system to work harder, the HDX700 ends up being a bit too loud for a quiet living space. Custom cooling would help this, yet Planet offers no such options.

I really like the VFD display, but the open-source LCD Smartie software that powers it is an exercise in scripting study and patience. Potentially, it can display anything from RSS feeds to system stats, but out of the box, the display merely shows the system's model name and vendor. There are friendlier VFD implementations available.

The LC03V sports a brushed black aluminum face with gorgeous, lacquered metallic black paneling. However, I quickly found that this glossy surface soaks up fingerprints and smudges like mad and scratches very easily. I used an optical mouse on top of it for a few minutes and were shocked at the scratching left by the mouse's plastic pads.

In operation, I only hit one serious flaw. The first visit to MCE's Live TV area yielded the infamous "Decoder Error: The video decoder has either malfunctioned or is not installed." A quick trial version download of NVIDIA's excellent DVD Decoder eliminated the problem.

All else on the HDX700 is good news. Planet's choice to run matching 250GB Maxtor drives in a RAID 0 is wise (albeit optional), the interior cable management is good, the version included a Mitsumi combo floppy/flash card reader, and I had no stability problems. Video quality in live and recorded TV, as well as DVD playback, was impeccable, but keep in mind that this was using NVIDIA Decoder along with the system's single-tuner Hauppauge WinTV-PVR-250MCE. Planet doesn't throw a barrage of lame trialware at buyers, and I applaud the company for donating $50 of every system sale to charity. One year of next-day, onsite service and 24/7 phone support earns kudos, too.

The HDX700 is a good stab at a mainstream MCE system. Planet's chief fault is that it needs to think past the checkbox items. Anyone paying $2,400 for a PC will probably shell out a few more bucks for items such as quieter running, a superior decoder, and easier VFD configuration. ▲

by William Van Winkle

Specs: Intel P4 530 (3GHz/800MHz FSB), Intel 915P chipset, 2 Corsair CM2X512-5400C4, eVGA GeForce FX 6600 GT 128MB, Hauppauge WinTV-PVR-250MCE, 2 Maxtor 250GB SATA with 16MB, Lite-On SOHW-1633S DL DVD+RW (16X DVD+R), Realtek ALC860 audio
(NOTE: Subscribers can go to www.cpumag.com/cpuapr05/hdx700 for bonus benchmark numbers.)

XDX700
$2,381; as configured
Planet Computers
(866) 486-4959
www.planetcomputers.com

CPU CPU CPU

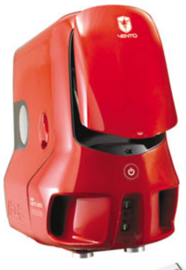
CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Designer Case Face-Off:

ASUS vs. ThermalRock

One looks distinctly like a Ferrari Enzo, and the other resembles a Sharper Image CD tower. But the two cases are more than just pretty faces. They've been designed with cooling, functionality, and ease of use in mind.

For example, you can take apart and put back together the ASUS Vento 3600 without any tools at all. Sure, you'll need a screwdriver to install your motherboard; however, optical drives, hard drives, and add-in peripherals make for relatively simple upgrades. Locking levers, plastic snaps, and large knobs do everything from opening the chassis door to securing drives without fuss.



Vento 3600
$159
ASUS
(510) 739-3777
www.asus.com
CPU CPU CPU CPU

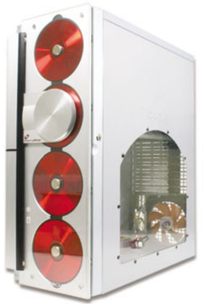
Beyond the exterior plastic, ASUS' Vento is built from steel with plenty of room for upgrading. It boasts four externally accessible 5.25-inch bays, one external 3.5-inch floppy bay, and three internal bays for hard drives, two of which are cushioned by rubber grommets. My only critique is that many power users would trade some of those 5.25-inch bays for additional hard drive space.

Vento's amenities include a built-in 120mm exhaust fan ideal for moving lots of air and not generating too much noise. An 80mm fan in the front puts those scoops to good use, sucking air into the chassis. Additional internal features include an intrusion sensor and a detachable hard drive cage.

Of course, Vento's selling point is its wild exterior. The automotive cues are unmistakable, combining smooth curves, pearlescent paint, gaping vents, and even a gull-wing-style front cover. ASUS doesn't publish its zero-to-60 times, but from this car nut's perspective, the aggressive aesthetic, accentuated by LED lighting, is actually quite tasteful. Four USB 2.0 ports and 1/8-inch audio jacks rest between the scoops, while ASUS' Magic Mask feature, a spring-loaded front door, hides exposed drive bays. I like the gull-wing-door idea but would like to see a more supportive mechanism that prevents flimsy side-to-side movement.

Whereas most tower cases fit well in tight spots, the Vento really commands its own floor space due to size and appearance. Unconventional dimensions do work against the chassis somewhat, which is more than a foot wide. And to that end, ASUS' Vento is a work of art.

In sharp contrast, ThermalRock's Circle case almost looks like it should be hung on a wall. At first glance, you might even mistake the chassis for Bang & Olufsen's BeoSound 9000 music system. Unfortunately, the CDs displayed on the outside of the Circle are decorative. ThermalRock calls those four discs CD storage. The discs actually help compose a hinged door that covers exterior drive bays. Magnetic contacts keep the door securely closed and provide light resistance when you tug on it, while blue LED lighting shines through the entire acrylic front panel for extra flair. There are two USB ports and one FireWire connector on top of the Circle; power and reset buttons are still inside the front door, though.



Circle
$149
ThermalRock
(626) 968-9189
www.thermalrock.com
CPU CPU CPU

The Circle's interior is roomier than ASUS' Vento. So much so that the chassis supports extended ATX motherboards measuring up to 12 x 13 inches. Drive expansion consists of five 5.25-inch external bays, two 3.5-inch bays, and no fewer than six available spots for hard drives. Although installation is more involved compared to the Vento, guide rails are still much better than traditional screw designs.

Cooling comes compliments of two 120mm fans spinning quietly at 2,000rpm. An extra 80mm bay is available for intake, but you'll have to buy your own fan to populate it. In stock form, the case generates very little noise on its own accord.

Despite the drastically different styling cues, the ASUS and ThermalRock cases share a few points in common. They're both built of steel, they both feature toolless construction, neither includes a power supply, and both cases are stylish in their own unique ways. Given the subjective nature of aesthetics, it'd be hard to declare a winner, but I've always been partial to Ferrari's Enzo. . . . ▲

by Chris Angelini

Specs: Magic Mask vertical front panel cover, 4 5.25-inch drive bays, 1 3.5-inch external drive bay, 3 3.5-inch internal drive bays, 1 80mm vent fan, 1 120mm exhaust fan, toolless installation, steel chassis

Specs: Aluminum front panel with exchangeable CD storage, 5 5.25-inch drive bays, 2 3.5-inch external drive bays, 6 3.5-inch internal drive bays, 1 120mm front intake fan, 1 120mm rear exhaust fan, steel chassis

CPU Ranking: ☐ 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Profiting from the
1st New Industry
of the 21st Century

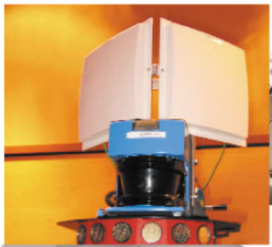
Produced by

RoboticsTrends

IDG WORLD EXPO

Premier Sponsor

iRobot™



SECOND ANNUAL

ROBOBusiness Conference and Exposition

The Nation's Premier Business Development Event for Mobile Robotics and Intelligent Systems

May 10-11, 2005
Hyatt Regency Cambridge
Cambridge, MA

www.roboevent.com

Photos courtesy of iRobot, SICK, K-Team, CTG, Business Design Lab, ActivMedia Robotics, LLC.

Corporate Sponsors

CTG
mBus machineBus.com
ShopBot The Workshop Robot
CoroWare
PERCEPTEK
Smart Robots
evolution robotics
Openware Robotics
SICK
FOCUS robotics
Robotic Sciences
SYSTRONIX Embedded Java Spoken Here
Frontline ROBOTICS Mobile Security & Response www.Frontline-Robotics.com
RWT
Valde Systems, Inc.
ROGUE robotics
Weber Robotics Inc.

Premier Media Sponsor

POPULAR science

Media Sponsors

ABIresearch
CIRCUIT CELLAR
CPU COMPUTER POWER USER
Digital World
Entertainment Engineering
E-DRIVE
Industrial Robot An International Journal
INDUSTRIAL-UTILITY VEHICLE & MOBILE EQUIPMENT
ITtoolbox
NetworkWorld
Nuts & Volts
PC WORLD
ROBOTBOOKS.com
ROBOTICS WORLD
MOTION control
robofolio
sensors
SERVO
Technology Review

Association Sponsors

ENet
OMG
GETI Global Emerging Technology Institute
THE TECHNOLOGY COLLABORATIVE
NEW ENGLAND BUSINESS AND TECHNOLOGY ASSOCIATION
Mass Software Council

Turtle Beach Audio Advantage Micro

Audio Advantage Micro
$29.95
Turtle Beach
(800) 233-9377
www.turtlebeach.com

Turtle Beach aims to turn laptop audio into something better with Audio Advantage Micro; a USB dongle with an 1/8-inch audio output jack and an 1/8-inch-to-optical SPDIF adapter. This lets you use headphones, stereo line-out, or a SPDIF link to a home amplifier, PC, or speaker set with built-in decoding. Turtle Beach builds in HRTF technology to simulate 3D from stereo. On headphones, the "rear" channel effect was decent once I stopped concentrating on it, although the "fronts" still sounded entirely lateral. Piped into the Logitech Z-5500s via the SPDIF port, the effect was the opposite—all front and no rears. Overall, Turtle Beach's HTRF implementation isn't as good as QSound's, but it does add a bit of zing into games.

Additionally, the AA Micro's native amplification kicked out way more power than the Toshiba Qosmio's native adapter (see our Spotlight article in this issue on page 69). This will come in handy with speakers prone to hissing at higher volume levels. At regular to moderately loud listening levels, I didn't hear any added noise from the AA Micro, but purists may still note some weakness in Turtle Beach's mids and highs.

The AA Micro supports Dolby Digital and DTS pass-through, so when I went SPDIF from the notebook into the Z-5500s and played the lobby shooting spree from "The Matrix," I heard full-on Dolby Digital surround and was quite pleased with the channel separation. Music playback with and without the AA Micro is like night and day if you're going through line-out, but only incrementally better on headphones.

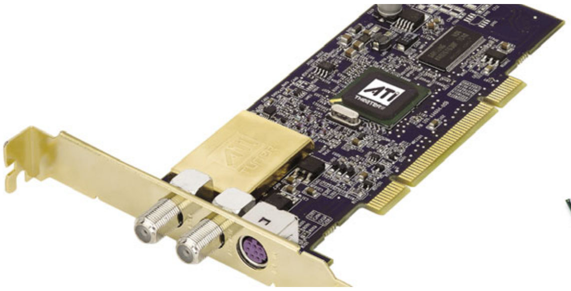
I was frustrated with how Windows always recognized the adapter but only worked sometimes. The best success came after a fresh driver installation in a new USB port, but this approach, obviously, can't last for long. The 10-band equalizer and environmental effects are good additions, but only if the adapter is working.

This is a space-efficient, budget-friendly alternative to something such as Creative's Audigy 2 ZS Notebook, but don't expect miracles. ▲

Specs: Interface: USB; Output: 1/8-inch analog stereo and optical SPDIF; Dimensions (approx. without cap): 2.3 inches high x 0.9 inches wide x 0.4 inches deep

by William Van Winkle

ATI TV Wonder Elite



TV Wonder Elite
$149
ATI
(905) 882-2600
www.ati.com

Before it was slinging some of the best 3D architectures on the market, ATI wowed audiences with cutting-edge multimedia features. Although much of ATI's focus is now aimed at achieving faster 3D frame rates, the multimedia business is still thriving.

Microsoft's Windows XP MCE is one reason manufacturers are fervently trying to polish their TV tuners and drivers. ATI's TV Wonder Elite, though not currently on Microsoft's Logo Partner compatibility list, is said to work with the media-centric OS.

Built around ATI's Theater 550 Pro chip, the TV Wonder Elite is a full-featured TV tuner that comes with a revised remote control and familiar I/O. The board sports 16MB of cache and a silicon tuner covered by a golden tin. In a bid to simplify the user experience, ATI unfortunately forsook its own multimedia center software suite in favor of Cyberlink's MCE-like solution, which feels bloated and performs rather poorly. Settings are purposely kept to a minimum, thereby limiting personalization.

TV Wonder Elite features functionality that you'd expect from an expensive TV, such as a hardware 3D comb filter, a five-line 2D filter, noise reduction circuitry, an audio processor, higher-quality 12-bit video decoding, and MPEG encoding capabilities for accelerated PVR performance. In order to truly take advantage of those features, however, you need the right setup. As I found out, over-the-air broadcasts received by antenna don't make for an ideal picture-quality test platform. Moreover, I'd like to see ATI offer its multimedia center software as an alternative to PowerCinema because the simplified user interface is bogged down by frustratingly slow responsiveness.

Although high-def TV is all the rage nowadays, ATI has long needed an MCE-certified tuner for analog reception. And although the card still isn't on Microsoft's approved list, it should be added shortly. Without question, $150 is a lot to spend on an analog tuner, but ATI does offer a better set of features and a wicked little remote control with its TV Wonder Elite when compared to Hauppauge's single-tuner board. ▲

Specs: Theater 550 Pro processor, 16MB RAM, PCI interface, Cyberlink PowerCinema software, Remote Wonder Plus controller, I/O breakout box included

by Chris Angelini

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Anand's Corner

Much Ado About Cell

(Part I)

by Anand Lal Shimpi

At ISSCC 2005, the curtains were drawn exposing the long-awaited Cell architecture: A joint venture between IBM, Sony, and Toshiba—and the heart and soul of the upcoming PlayStation 3 . . . maybe even more.

The first Cell processor introduced was a bit of a mammoth. It was manufactured on IBM's 90nm SOI process, the prototype die measured in at 221 mm^2 and had around 234 million transistors. At these transistor counts and die sizes Cell is not a cheap chip to manufacture. We're talking larger than most GPUs and with significantly higher manufacturing complexities considering that we're talking about a 3 to 5GHz chip.

The version of Cell used in Sony's PlayStation 3 will most likely be 1/2 to 3/4 the size of the prototype, but it will still (at least initially) be built on a 90nm process. Given the size of the prototype, Cell was clearly designed for 65nm, meaning that Sony will either be taking a bigger than usual loss on each PS3 it sells or you can expect the console to make a pricey introduction (remember PS3 will also have a Blu-ray drive, as well as some form of a NVIDIA GPU, both of which will drive cost up).

As I just mentioned, the Cell processor is supposed to run at anywhere between 3 to 5GHz. The chip can run at such high clock speeds by making extensive use of a form of dynamic logic, which (to put it simply as possible) is a more complicated way of laying out transistors that results in fewer transistors, lower power consumption, thus enabling higher clock speeds. The downside is that the chip is more difficult to manufacture, but it's a tradeoff that the designers were clearly able to make.

The Cell processor itself is a multicore CPU; more specifically it's composed of nine independent processors. IBM developed a custom POWER derived processor for Cell that's designed to handle the distribution of tasks to the other eight processors. The PPE (Power Processor Element) as it is called will also run the OS and other related tasks. The eight other processors are each identical to one another and are called SPEs (Synergistic Processing Elements). The SPEs each operate independently of one another and have their own local memory (256KB per SPE)—note that this memory isn't cache, as it is managed by the programmer even though it is made of SRAM cells just like most microprocessor cache is.

The Cell processor includes two Rambus XDR memory controllers on-die, as well as a Rambus FlexIO controller to connect to other chips (including other Cells, I/O chips, or even GPUs). The bandwidth offered by both the on-die memory controller and the FlexIO controller totals around 100GBps, an incredible amount of bandwidth for any single chip.

I've purposefully left out a lot of the architectural details about Cell because it would take many more pages to explain how the chip works (I've done so on AnandTech, so if you're truly interested drop on by and learn more), but there is one fundamental design philosophy about Cell that must be understood: The processor is optimized for optimal performance per transistor spent. So while we're talking about a very large chip at 234 million transistors, it's probably the most efficient use of transistors from any modern day desktop/gaming microprocessor.

The first obvious application for Cell will be Sony's PlayStation 3. Although many have theorized that the eight SPEs could be used as pixel-rendering engines for an on-CPU graphics core, I think the much more realistic possibility is that the Cell will be used for all physics and vector processing in the PS3, with an external NVIDIA GPU being used for all of the pixel rendering. Much like the GPU brought a very parallel processor to tackle complex graphics rendering, I expect the Cell's SPEs to do the same for game engine physics. Who knows if Cell will make it far beyond a game console, but the idea behind Cell is one that's quite promising.

What remains to be seen is how difficult Cell is to program for. In the meantime, the power to revolutionize game engine physics is a very present feature of Cell. In my opinion, a Cell-style architecture will be to game engine physics what the GPU was for 3D game rendering. ▲

Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today, *CBS' 48 Hours and* Fortune. *His site—www.anandtech.com—receives more than 55 million page views and is read by more than 2 million readers per month.*

Who knows if Cell will make it far beyond a game console, but the idea behind Cell is one that's quite promising.

Talk back to Anand@cpumag.com.

The Shark Tank

Remember VIA Technologies?

by Alex “Sharky” Ross

Disrupting Reuters’ newswire with a cheery Christmas greeting at age six, Alex “Sharky” Ross became an avid computer user/abuser, eventually founding popular hardware testing/review Web site SharkyExtreme.com. Exposing shoddy manufacturing practices and rubbish-spouting marketing weasels while championing innovative products, illuminating new technology, and pioneering real-world testing methods was just a front for playing with the best toys. The site acquired, he left in 2001. A London native and London School of Economics graduate, Alex currently overclocks/tunes Porsche 996 Turbos with www.akkuratpgi.com when he’s not tweaking PCs.

VIA is most synonymous with its AMD chipsets. Other than a few legal spats with Intel and mostly paper launches, it has not really done anything significant for the Pentium 4. On the PCI Express front, even NVIDIA has signed up for the Pentium 4 bus license, so if PCI-E has had a slow induction, it matters not at this point—it’s obviously here to stay. With the PT880/PT894/PT894 Pro chipsets, VIA will also have a platform for the Pentium 4 with support for PCI-E, DDR2 memory, and the 1,066 FSB.

The PT894 Pro is perhaps the most enticing, as it is being aimed at us enthusiasts/gamers. Not only does it support PCI-E graphics cards, but with the VIA DualGFX Express, you’ll be able to slot a couple of cards in an x16 by x4 configuration. However, don’t get clambering for SLI just yet. There’s no alternative frame rendering here but merely both cards running at the same time (in x16 for the primary and the other at x4), which allows for up to four monitors. The Pro version’s northbridge actually sports 20 PCI-E lanes for graphics. Also worthy of note is that you won’t have to chuck out your DDR memory in favor of expensive DDR2 because the chipset supports both.

The new VT8251 southbridge dishes out a few extra PCI-E lanes, as well, and is perhaps the company’s best offering to date. With VIA’s DriveStation you get two integrated IDE interfaces for four ATA133 drives, four SATA ports, and SATA II with command queue support for those ultra-fast drives with 300MBps just around the corner. With a Port Multiplier you could connect multiple hard drives to a single SATA connection (apparently as many as 60). You could, but you don’t have to. And of course you can expect all your usual RAID goodies, including 0, 1, 0 + 1, JBOB, and even RAID 5.

Need more connectivity? Well, you also get eight USB 2.0 ports. But perhaps the niftiest feature of all has to be the company’s push toward hi-def audio with Vinyl Audio. You get AC ’97 7.1, 24/96 resolution digital outputs, and support for DirectSound3D, A3D, I3DL2, EAX, and EAX2.0, so you’ll be in good hands for gaming. As with previous VIA chipsets, the company uses its own proprietary interconnect dubbed V-Link for linkage between the northbridge and southbridge. Only this time the V-Link is beefed up to be able to handle up to 1GBps worth of transfers.

The early numbers bode well for the PT894 chipset (even if 1,066MHz is not yet functional) against Intel’s own 925X. Although the 925X is slightly faster in Doom 3 and UT2004, the PT894 is actually a bit faster in other games like Half-Life 2 and Far Cry. Clearly, with some driver tweaks and more time, it will likely be a very sturdy challenger to the 925X and give potential P4 customers something to think about.

With an end of Q1 2005 release, the PT894 Pro might be a bit late in coming, but it’s still an impressive piece of technology and will probably end up being the way to go for enthusiasts with a P4. A non-Pro PT894 should be released by the time you read this and priced very competitively in comparison to the Intel 925X. Also worthy of note will be the PT880 Pro, which will be targeted as a lower-end Pentium 4 platform.

2004 was not the best of years for VIA, and 2005 will see the company playing catch-up, but it wasn’t so long ago that it was on top when it came to the Athlon. In terms of the future, VIA already has plans for 110 and 90 nanometers, and also intends to go the way that NVIDIA currently sits with its single-chip solutions. ▲

> The 894 Pro is perhaps the most enticing, as it is being aimed at us enthusiasts/gamers

Email me your VIA KT133 chipsets to sharky@cpumag.com

[Hard] Talk

64-Bit & You

by Kyle Bennett

Kyle Bennett is editor-in-chief of HardOCP.com (hardocp.com), one of the largest and most outspoken PC-enthusiast sites on the Web. HardOCP.com is geared toward users with a passion for PCs and those who want to get cutting-edge performance from their systems. Beware, though, Kyle is known for his strong opinions and stating them in a no-nonsense manner while delivering some of the most in-depth reviews and PC hardware news on the 'Net.

Awash in a sea of 64-bit CPU marketing fluff? Have you been pumped full of spin from AMD and now Intel with the release of its first 64-bit desktop processor? Are you wondering exactly what this will mean for you? Don't fear. I have a few answers that will keep you on an efficient upgrade path. Keep in mind that we are primarily addressing the desktop PC user here, but we'll touch on the professional market, as well.

First, what exactly does 64-bit computing mean? Today's Windows computing experience comes in a 32-bit flavor. A new 64-bit system will let the CPU access a data stream that's 100% wider. Along with being able to use nearly endless amounts of system RAM, this will let your computer access much larger files and give it a huge memory address space. And the bottom line is that accessing huge files from system memory is thousands of times faster than pulling them off your hard drive.

To have access to any benefits of 64-bit computing, you will need two things: a 64-bit processor, such as AMD's Athlon64 or Intel's Pentium 4 with EMT64 support, and an operating system that is 64-bit ready, such as the upcoming Windows XP Professional x64 Edition. And that is just the base of what you will need. All that hardware you have tucked neatly inside that ATX case will need 64-bit drivers, as well.

If you are getting the feeling that 64-bit computing is a bit more involved than just having a shiny new CPU on your motherboard, you are absolutely correct. Of course, once you can actually buy an operating system that will support 64-bit, things will be much easier—but you are still far from done. For those brave souls who want to take the 64-bit dive now, Microsoft is offering the Windows XP Professional x64 Edition Customer Preview program at www.microsoft.com/windowsxp/64bit/default.mspx. Head over there and you can download the ISO file or have Microsoft send you the CD for cheap. (The CD was to be available in late February.)

Once you have all the needed 64-bit hardware, a 64-bit operating system, and 64-bit drivers, you will need something else to reap the 64-bit rewards, and that is applications that are actually coded to take advantage of the 64-bit perks. Here is where the story gets sort of bleak and is prefaced on Microsoft's x64 Edition Web page as: "Windows XP Professional x64 Edition is designed to address the most demanding needs of technical workstation users who require large amounts of memory and floating point performance in areas such as mechanical design and analysis, digital content creation and scientific and high-performance computing applications."

Notice there is no mention of any desktop application outside of digital-content creation. This brings us to what 64-bit computing is going to offer the desktop user in the foreseeable future once the hardware, drivers, and operating system are available. The short-and-quick answer is very little. Unless you are a hard-core user of video-editing tools, there is likely going to be no advantage to you having a 64-bit system; it's just that simple. But if you happen to use 3ds Max or Adobe Premiere and can get the right patches for the software or a new 64-bit edition, you will likely see some positive impact. For the desktop user, though, he is likely better off focusing on dual-core technology that's up and coming from AMD and Intel. Better yet, he could reap the rewards that Intel's Hyper-Threading has to offer when it comes to having an overall smoother user experience.

Games will certainly benefit from 64-bit computing, but it will be a ways down the road before we see it. My guess is that it will be late 2006 to mid-2007 before we actually see any gaming content that truly exploits 64-bit computing.

The bottom line is that 64-bit computing is going to be a great thing, but it isn't going to be a sweeping change that we will need to spend money on to get ready for anytime soon. The migration to 64-bit computing will be a smooth transition that most of us don't need to rush into but can get ready for a small step at a time. ▲

> Unless you are a hard-core user of video-editing tools, there is likely going to be no advantage to you having a 64-bit system. . . .

You can talk with Kyle at kyle@cpumag.com

PC Modder

Tips & Tutorials

Modding does the body good. A PC's body anyway, inside and out. Here you'll find hardware, firmware, tools, tips, and tutorials for modding your rig's performance and appearance. Send us your own mod-related tips and ideas at modding@cpumag.com.

Modding enthusiasts have a penchant for the latest toys. Fast processors, powerful video cards, silent SFF enclosures, and radically lit motherboards are all fair game when it comes to a modder's creative mind. Recognizing the appeal of unconventional customization, an entire industry has emerged to support the community.

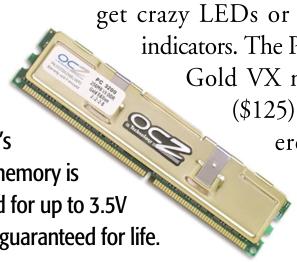
Mods & Ends

OCZ EL DDR PC-3200 Gold VX

If you want to save money without taking a performance hit, consider OCZ Technology's PC-3200 Gold VX lineup. The VX (Voltage Extreme) reflects OCZ's technology, which protects modules at up to 3.5V (with a lifetime warranty).

Current top-end VX modules come in DDR400 trim and are rated for 2-3-3-8 timings at default voltages of 2.6V. At an astounding 3.2V, OCZ claims the VX modules will hit 2-2-2-8 latencies, performing on par with premium modules from other vendors that can cost much more. OCZ reps say they've seen some incredible overclocking experiences with VX modules at higher voltages, too.

The Gold series kits aren't at the top of OCZ's revered product line, so you won't get crazy LEDs or activity indicators. The PC-3200 Gold VX modules ($125) are covered with gold-colored copper heat spreaders, though. Now, if we can only get OCZ to design some comparably flexible DDR2 modules.



OCZ's VX memory is rated for up to 3.5V and guaranteed for life.

Razer Diamondback Mouse

Five years ago, Karna released a gaming mice family that used responsive processors and high-res sensors to improve accuracy of wrist movements. Despite those advancements, the designs never really took off, and the Razer lineup disappeared.

Now, Razer USA is resurrecting the gaming mouse with its Diamondback ($59). It also strays from accepted ergonomic lines and embraces individuality; but this time flat buttons and a light feature set aren't detracting from the Diamondback's appeal, even in the face of Logitech's imposing laser-powered MX1000.

There's no wireless connectivity, but Razer's Diamondback boasts an ultra-long 7-foot cord, ensuring that you won't miss that wireless feature. Moreover, 1,600dpi resolution means the Diamondback easily bests the MX1000's 800dpi.

As far as design goes, the Diamondback is equally comfortable to left- and right-handers. The top buttons are large and responsive for their size, but the side buttons aren't placed very well and don't map well to custom functions. No gaming mouse would be complete without glowing lights, and the Diamondback doesn't disappoint in this department.

As admitted proponents of wireless technology, we've had a hard time giving up our MX1000 for a wired design. However, the Razer Diamondback sets a new standard for precision in competitive gaming.

Victorinox SwissMemory 512

Take an original Victorinox Swiss Army Knife with a blade, nail file, scissors, screwdriver, retractable ball-point pen, and mini LED and add a 512MB USB flash drive. Now, give it a translucent red cover for $157. Sound cool? You bet. Victorinox also includes its Secure-LOCK software to keep the memory stick protected against unauthorized access. For something more likely to make it through airport security, a knifeless SwissMemory Flight 512 sells for $150. There's no word if the Swiss military has adopted the technologically yet.

Too cool. The SwissMemory 512 is the ultimate handyman tool.

Fashionably Fresh Firmware

Apple iPod mini and Click Wheel v.2005-01-11

This latest update adds support for iTunes 4.7, creates multiple On-The-Go playlists, improves disconnect performance, and lets you hear the Click Wheel through headphones.

www.apple.com

D-Link DSM-604H Ethernet Media Storage v.1.14

This update resolves a file-transfer issue with clients using Mac systems and facilitates interoperability with D-Link's DSM-320 Media Lounge device.

support.dlink.com

Nikon D70 SLR Camera v.B 1.0.3

This Nikon firmware corrects a color-space issue plaguing certain captured images.

www.nikonusa.com

Plextor PX-716A DL DVD+/-R/RW Writer v. 1.04

The latest firmware for Plextor's flagship adds 6X double-layer support, recognition of 2X dual-layer burning, improved AUTOSTRATEGY performance, and better write quality.

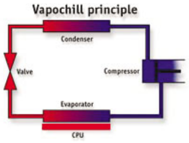
www.plextor.com

by Chris Angelini

Chill, Baby, Chill

Build Your Own Phase-Change Cooling System

The one thing that all die-hard PC enthusiasts crave is speed. Our processors are never fast enough, and we're always looking to that next generation of graphics and memory technology that's just on the horizon. The same way that rabid gear-heads drop larger motors and nitrous into their cars to make them faster, hard-core PC enthusiasts go to extremes to increase the performance of their rigs. It was with this desire to tweak a system for maximum performance that we decided to build an exotic phase-change cooled machine that will overclock to levels impossible to attain with more conventional equipment.



Phase-change cooling works by pumping coolant through a tube to the cold plate where the coolant heats up and vaporizes. The heated vapor is moved to a condenser where it's converted into liquid and is pumped through a compressor and ultimately back out to the evaporator.

Phase-change CPU coolers use the same technology that lets the refrigerator in your home, or air conditioner in your car, function. The main difference is that instead of pumping cold air into a large, sealed space, a vapor phase-change CPU cooler transfers the coolant in the system to an evaporator/cold plate that's directly attached to the processor. The specialized liquid coolant pumps down an insulated tube to the cold plate, where heat from the processor transfers into it. As the heat builds up, the coolant liquid in the cold plate also heats, boils, and vaporizes. It then returns to the system and collects in a condenser where it's pressurized and cooled until it's transformed back into its liquid state. The compressor pumps the coolant out to the cold plate, and the cycle repeats. The process results in temperatures at the cold plate well below freezing. Lower temps allow for higher operating frequencies, or in geek-speak, overclocking.

The VapoChill LightSpeed [AC] can dissipate more than 200W of heat while maintaining evaporator temperatures of approximately -27 degrees Fahrenheit.

The Parts & Prices

Assembling a system to properly use the Asetek VapoChill LightSpeed [AC] unit requires some specialized components. We acquired hardware that not only matched the look of the LightSpeed, but also allowed for maximum overclocking. This machine was built for performance, but because phase-change cooling hardware is so expensive, we tried to save a few bucks when possible. We were much more practical in choosing our CPU, drives, RAM, and video card. After all, we're planning to overclock this system to extreme levels, which will somewhat negate the performance advantages that top-of-the-line (and more expensive) processors and video cards offer. At more than $2,000, our rig is by no means practical, especially by today's standards. However, it will surely be a lean, mean, extremely overclockable gaming machine. ▲

- **Case:** Lian-Li PC-60 ATX midtower, $85
- **Power supply:** Thermaltake Silent PurePower 560W PSU, $100
- **Memory:** 1GB pqi TURBO Series Dual Channel Platinum DDR PC-4200, $250
- **Motherboard:** MSI K8N Neo2 Platinum Edition (nForce 3), $130
- **Video card:** PNY GeForce 6800 GT 256MB (AGP), $345
- **Hard drive:** Western Digital 80GB 7,200rpm SATA, $60
- **Optical drive:** NEC 16X Double-layer DVD±RW, $60
- **Floppy drive:** Alps 3.5-inch, $8
- **Processor:** AMD Athlon 64 3000+ OEM (Socket 939), $145
- **Phase-change cooling system:** Asetek VapoChill LightSpeed [AC], $860

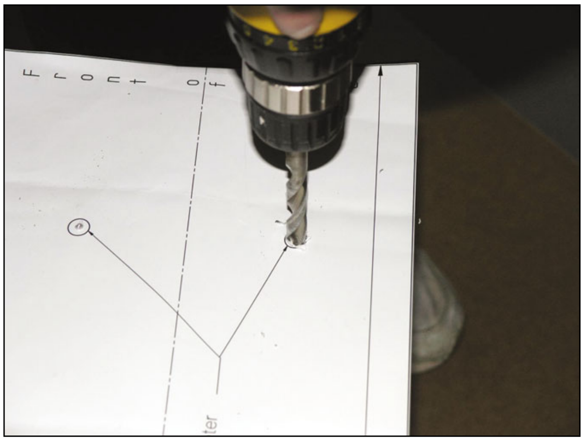
Total system cost: $2,043

In this article we'll detail the equipment and steps needed to build a phase-change cooling system. Next month we'll actually overclock our CPU to note the difference. We're using Asetek's current flagship product, the VapoChill LightSpeed [AC], for our phase-change cooled system. The LightSpeed is a rectangular cube that's designed to mesh with Lian-Li's PC-6x, PC-7x, PC-6077, or PC-6085A cases. The LightSpeed's enclosure is perforated along its face and in a sloping pattern along either side in a manner that mimics Lian-Li's aluminum ATX enclosures.

The LightSpeed will work with about any midsized case, but it just won't look right. It wasn't the LightSpeed's appearance that drew us to it, however. Its main appeal is its ability to dissipate 200W of heat energy while maintaining a cold plate temp of about -27 degrees Fahrenheit. At 0W, it can hit a cold plate temperature as low as -58 F. Air and watercooling equipment can't match this kind of cooling performance. Additionally, we'll be able to run a slower, relatively inexpensive CPU at clock speeds rivaling or surpassing more expensive CPUs.

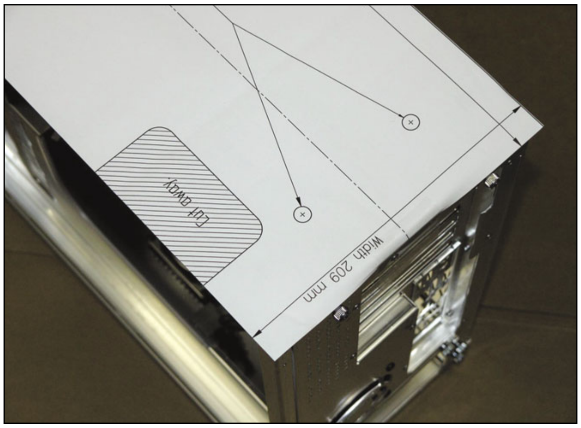
Break Out The Power Tools

To install and use the LightSpeed as Asetek intended, we had to make some modifications to our motherboard and case. The LightSpeed is basically a self-contained unit with some wiring and the evaporator/cold plate assembly protruding from its upper surface. To properly feed the wiring and evaporator assembly into the case and physically secure the LightSpeed to it, we had to drill four holes and cut away a portion of the midtower Lian-Li PC60's underside. Asetek supplied a full-scale paper template with the LightSpeed that made the process fairly easy. Once we verified that the template mated correctly with the LightSpeed, we secured the template to the case's underside with transparent packing tape and got out the appropriate tools, which of course included protective eyewear.



After creating a divot in the template, we drilled small pilot holes, and then larger holes, to accommodate the LightSpeed's mounting hardware.

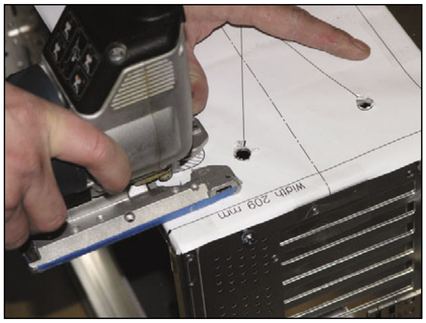
We used a center punch first to make small divots in the template and the case's surface, to make it easier to hold our drill in place until the drill bit entered the material. We were required to drill four 10mm holes into the base of our enclosure, but starting out with a drill bit that large can be somewhat difficult. Thus, we drilled four pilot holes in the appropriate locations with a 2mm bit and then moved to the 10mm bit. We were drilling into aluminum, which is relatively soft. With a steel case, it might be a good idea to move up to a 5mm or 6mm bit after drilling the initial pilot holes before moving to a 10mm bit.

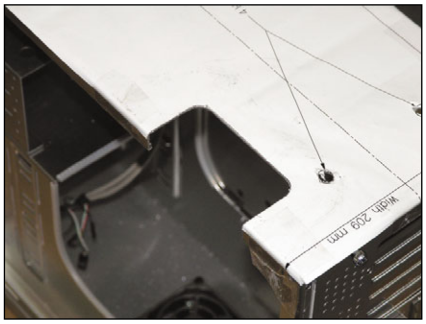


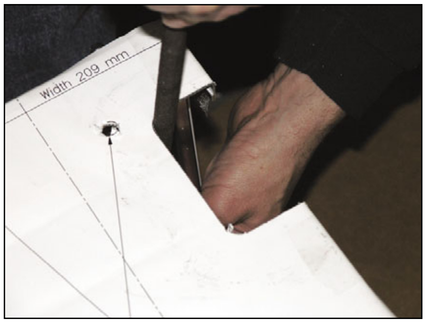
We used an included template to drill the appropriate holes and cut away the proper amount of material from the underside of our Lian-Li PC-60 case.

With the mounting holes drilled, we moved onto cutting away a portion of our case enclosure to provide the VapoChill's wiring and evaporator a conduit into the case. We could have used a variety of tools, such as a Dremel or hacksaw, to do this, but we took the Tim-the-Tool-Man-Taylor approach and fired up our Bosch power jigsaw. Outfitted with a new fine-toothed blade designed for cutting metal, the jigsaw cleanly cut through the case's aluminum in seconds. We first cut the straight lines leading to the curved portions of the template, and then we carefully worked the jigsaw around the curves using a small stair-step motion.

After trimming the required chunk of material from the case, we cleaned the burrs from the edges and the drill holes using a rounded metal file. Then all we had left to do was thoroughly clean the rest of the case of metal filings and apply some rubber molding to the larger cut, before we could move onto the







We could have used a rotary tool or hacksaw to cut away the necessary portion of our case, but a Bosch jigsaw with a new blade cut through the aluminum like a hot knife through butter.

Your Vapor Phase-Change Cooling Options

Due to the relatively small market for exotic phase-change cooling solutions, there aren't many options available. Asetek's various VapoChill products have definitely been the most popular and accessible. nVentiv's (formerly Chip-Con) Prometeia Mach I and Mach II, however, have also been overclocker favorites. nVentiv has gone through some troubles of late, however, so it's more difficult to locate its products. A visit to a couple of online vendors that cater to enthusiasts yielded the following list of in-stock phase-change hardware:

- nVentiv Prometeia Mach II; $930
- nVentiv Prometeia Mach I; $550
- Asetek VapoChill LightSpeed [AC]; $860
- Asetek VapoChill Extreme Edition II [AC]; $895
- Asetek VapoChill Extreme Edition [XE]; $875

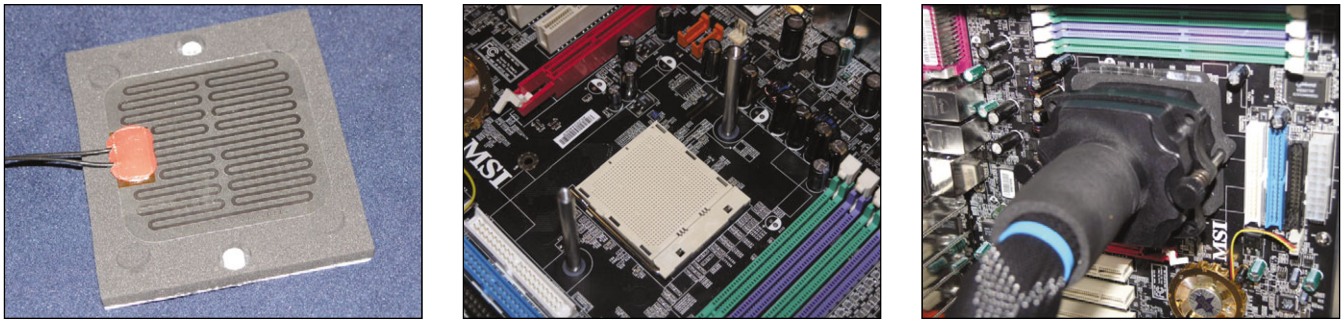
motherboard mod and installation phase of our project.

Mounting The Machinery

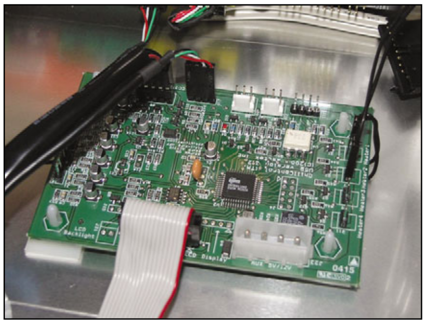
Securing the LightSpeed to the case was as simple as tightening a few heavy-duty thumbscrews. Then we began to prepare our motherboard and processor for use with the phase-change cooler. The VapoChill's evaporator/cold plate assembly, sometimes referred to as a "clamshell," isn't a simple replacement for a stock heatsink. There are some precautionary steps you need to take to protect your equipment. In addition, you'll need to use custom mounting hardware to safely hold the clamshell in place.

The first step of the motherboard mod was to remove the stock plastic heatsink mount and metal reinforcement plate from our MSI K8N Neo2 Platinum. The reinforcement plate was attached with some fairly strong double-sided adhesive, so we heated it up with a hair dryer and pried it off, being careful not to scrape the motherboard's underside. Next, we applied a layer of insulating foam and a heating element (meant to prevent condensation from forming under the CPU socket) to a metal plate supplied with the LightSpeed. The plate is designed to replace the stock reinforcement plate. Next, we screwed two threaded poles to the plate through the holes in the motherboard. (Only two poles are necessary with AMD-based boards; Pentium 4 boards require four.) The threaded poles help mount the evaporator/cold plate assembly in place over the processor.

At this point, we installed our CPU. First we made sure to coat its pins with nonelectrical conductive thermal paste to prevent condensation from forming on the pins and corroding them. We coated



Phase-change cooling solutions require using specialized insulation, heating elements, and mounting hardware. A metal plate with a heating element and foam insulation is mounted on the motherboard's underside, beneath the CPU socket, which two threaded metal rods hold in place. You'll also place foam insulation around the processor and nonelectrically conductive thermal paste to the CPU and socket. You'll mount the evaporator assembly over the processor with spring-loaded thumbscrews.



Asetek's custom ChillControl unit monitors temperatures, controls heating elements, and powers up the phase-change cooler and system.

the socket with paste, as well. This may seem strange, but it's necessary to protect your components. Next, we slid a fitted piece of insulating foam over the poles around the socket and then we applied another piece of foam so only the CPU's heat spreader was exposed. The heat spreader then got a layer of thermal paste. With the VapoChill's mounting hardware and insulating material in place, we installed the motherboard into our case.

The next step was to install the ChillControl USB module included with the LightSpeed. Asetek's custom ChillControl module controls the data displayed on the VapoChill's LCD and monitors various aspects of the LightSpeed. The module connects to the system through a 4-wire cable that plugs into an available USB header on the motherboard. It also connects between the case's power switch and motherboard's power-switch header. The ChillControl module ensures that the LightSpeed powers up first, cools the processor to a subzero temperature, and then it powers up the rest of the system.

Next, we installed the evaporator/cold plate assembly over the CPU. We slid the assembly over the metal poles that we had previously installed and used spring-loaded thumbscrews to secure it in place. As a precaution, we removed the assembly to make sure the cold plate was making good contact with our CPU. (It was.) After verifying the cold plate and CPU were mating properly, we reinstalled the assembly and moved onto installing the rest of our system's components.

The Fruits Of Our Labor

Using a high-powered, vapor phase-change cooling solution usually makes it possible to overclock Intel or AMD processors 20 to 60% higher than is pos-sible with more conventional aircooling or watercooling equipment. A vapor phase-change cooler can lower processor temps to levels unattainable with standard equipment. We'll overclock, fine-tune, and tweak our LightSpeed-cooled rig over the next few weeks and update you on our success (or failure) next month. CPU

by Marco Chiappetta

Our final product will look much like the system featured on Asetek's VapoChill LightSpeed information page. A pair of silver drives give the system a clean, professional look.

Phase-Change Faux Pas

Installing and maintaining a system cooled by a phase-change solution requires some steps that may seem alien to enthusiasts who are more familiar with aircooling or watercooling hardware. Thus, users new to phase-change cooling are prone to make some mistakes. Some of the most common include the following:

Not coating the socket and underside of the processor with thermal paste. The subzero temps associated with phase-change cooling make condensation a real problem. In the same way that water droplets collect on the side of a cold soda can in the summer, water droplets can form on and around the processor because it's operating at a temperature well below ambient. To minimize the chances for condensation, you must coat the entire CPU socket and the CPU's underside and pins with paste.

Using electrically conductive thermal paste to coat the socket and CPU's underside. Many thermal pastes, such as the popular Arctic Silver 5, are silver-based and can conduct electricity. If your processor's pins or CPU socket are coated with an electrically conductive material, it will cause a short circuit and damage your hardware.

Failing to install the motherboard and "clamshell" heaters. Heating elements are usually included with a vapor phase-change cooling solution to help prevent condensation above and below the evaporator. It may seem counterintuitive to install something that will cause increased temperatures, but these heating elements are vital to keeping the underside of the motherboard and clamshell (the housing that contains the evaporator) at or around ambient temperature.

Not installing insulation on the motherboard's underside and around the CPU socket. Adhesive foam insulation is included with phase-change cooling solutions. It acts as a barrier between components operating at subzero temps and room-temperature air. The foam insulation ensures water droplets don't form directly on your components, if they form at all.

Forgetting to connect a fan to the motherboard's CPU fan header. Many motherboards won't boot if they don't detect a fan connected to the CPU fan header. If your system doesn't start properly after installing a phase-change processor cooler, try connecting a separate fan (or the 3-pin fan lead coming from your PSU) to the CPU fan header. ▲

Screen image simulated. © 2005 Philips Electronics North America Corporation.

Experience television in a whole new light.

Philips flat TV with Ambilight. Turn on any flat TV from Philips with Ambient Light Technology, and watch what happens. Your eyes see more than what's on the screen, as color and light expand beyond the frame and onto the walls. You bask in the warm glow of the background lighting that automatically changes color and intensity to reduce eye strain and provide a more relaxed viewing environment. And with Pixel Plus™ 2, you experience the detail and vivid colors that are as close to real life as you can get. For a deeper view of the entire Philips Flat TV™ line, featuring Ambient Light Technology, check out www.flattv.philips.com. It's unlike anything you've ever seen before.

www.flattv.philips.com

PHILIPS
sense and simplicity

ambi light

PIXEL PLUS 2

advanced Q&A corner

Get informed answers to your advanced technical questions from *CPU*. Send your questions along with a phone and/or fax number, so we can call you if necessary, to q&a@cpumag.com. Please include all pertinent system information.

Each month we dig deep into the mailbag here at CPU *in an effort to answer your most pressing technical questions. Want some advice on your next purchase or upgrade? Have a ghost in your machine? Are BSODs making your life miserable?* CPU's *"Advanced Q&A Corner" is here for you.*

Ben Schechter asked: **I work with large access databases (1 million to 1.5 million records) and multiple Windows applications such as Excel, Word, and PaperPort. The last game I regularly played was Space Invaders. But database queries sometime take several minutes, and I occasionally have to close programs to free up memory.**

I'm thinking of the Pentium 4 Extreme (3.46GHz), MSI Neo Platinum 925X motherboard, 4GB of DDR2 RAM, and high-speed SATA mirrored hard drives. However, after reading numerous reviews, I'm confused over whether to wait for the updated motherboard (1,066MHz bus) or go with an AMD high-end setup. Also, I'd like to know whether these leading-edge components are better than midrange components.

A: Great question, Ben. This is one that we've been debating around the HotHardware.com labs for a couple of months now. The usage model you described is not uncommon but very different in terms of its system-level processing requirements vs. a typical gamer's usage model. Without question, if you are a heavy-duty gamer, the Athlon 64 powers the fastest systems on the planet right now. However, if you do a lot more than just gaming, especially in a multitasking desktop environment, the P4 is likely a better choice.

For as much flack as Intel took this year with respect to the P4's relatively low IPC (instructions per clock cycle) rating vs. an AMD Athlon 64, the P4 has some redeeming qualities as a result of its HyperThreading capabilities. Specifically, the P4 excels over an Athlon 64 in multitasking situations such as the ones you described. The PaperPort image-processing requirement on a paper scanning job alone is a decent burden on system bandwidth. Because the P4 has the ability to run multiple threads with its two logical processors in Windows XP, a P4 system will remain much more responsive as the number of tasks scale along with workload.

Road map product efforts for both Intel and AMD are building on dual-processor core designs for a good reason. As end users look at new applications for the PC, multitasking workloads for the average PC usage model are increasing exponentially. The fairly new HTPC concept is a perfect example of this; it lets users rip an audio CD, stream some video, and surf the 'Net all at the same time. Intel's HyperThreading technology was just a shade ahead of its time, but it's a very real value proposition now in this HTPC scenario. So, maybe you don't get 200fps in Unreal Tournament 2004 but only 180fps, but with a P4 you can also handle the type of multitasking stress you put on the system in

> "The question to ask yourself is, 'Can I really live with that one dead pixel?'"

many nongaming applications. However, the current Athlons won't handle this stress as well. But, dual-core Athlons are coming through, and just think about a dual core P4 (mid-2005, we're told) with HyperThreading for four logical system processing elements. Mmmm . . . smoothness.

On the subject of leading or "bleeding" edge components, depending on your budget, it may make sense to drop down a notch and buy a 3.2GHz Extreme Edition P4. The 3.46GHz model is crazy expensive, and tests have shown its 1,066MHz FSB doesn't offer that much more performance over an 800MHz FSB P4 at a similar clock speed.

Omar asked: I seem to have a problem with the AGP rate in my PC. My system hardware is the following: P4 2.4GHz, Intel P4S8X motherboard, and a SAPPHIRE Radeon 9800XT 256MB card.

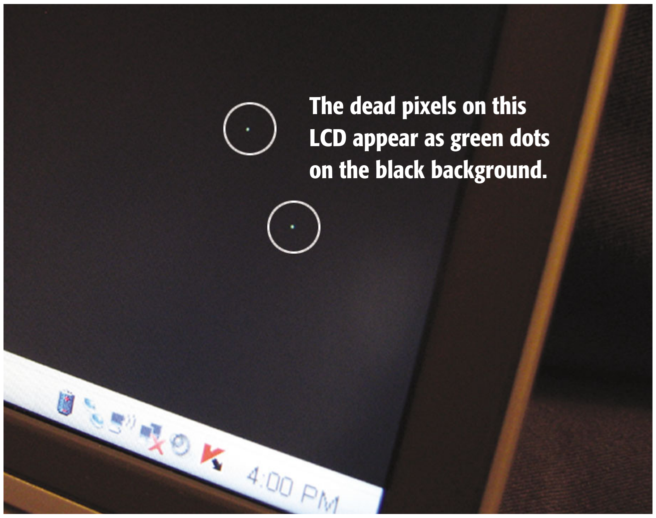
I had my PC set to AGP 8X, but it was unstable. So, I changed it to 4X, but when I tried to change it back to 8X, I couldn't. I'm using the latest drivers from ATI. I reinstall the Catalyst drivers, but nothing has changed. When I go into the BIOS it's set to AGP 8X, but in the Catalyst ATI driver it's still at 4X (4X is the highest setting shown in the driver control panel now). Any insight here would be great.

A: The motherboard model number you listed here, Omar, is actually an ASUS Pentium 4 motherboard based on the SiS648 chipset. Frankly, over the years this chipset has proven to be a bit finicky with various graphics cards and graphics card driver combinations. However, some other component, such as memory timings or processor cooling, could be the cause of the instability you mentioned. With those issues ruled out, however, let's look at your question on the AGP settings.

Most likely when you set the BIOS to AGP 4X, the ATI Catalyst drivers detected this change and invoked a Windows Registry modification that instructs the drivers to boot in 4X mode. This probably explains why the driver panel now only shows a 4X setting available. You could have ATI's Smartgart utility redetect your AGP speed, but we recommend uninstalling your ATI Catalyst drivers, reinstalling the latest SiS648 chipset drivers, making sure that BIOS setting is configured to AGP 8X, and then reinstalling the ATI Catalyst driver suite. Also, it's imperative that you have the latest versions of both the SiS and ATI drivers. Best of luck.

Dante asked: I've been in love with my Samsung SyncMaster 710T up until yesterday. One of my pixels decided to permanently go black. It's killing me. I can't stop looking at it. I just paid $429 to have this little black dot on the side of my screen. I can't return it because one dead pixel is considered tolerable by both Samsung and the retailer. I can see why people want to stick with CRT monitors. LCDs are expensive and then you have to deal with a certain level of defects before anyone wants to replace a defective product. This doesn't seem right. Is there anything I can do?

A: Unfortunately, Dante, historically the answer has been no. There isn't much you can do. However, we'll try to offer some explanations. First, subpixel anomalies, or dead pixels as they are commonly known, are very much part of LCD territory. The reason is all about defect density per panel, which is akin to the sort of issues that semiconductor chip manufacturers, such as Intel and AMD, have to deal with on a silicon wafer level. Only with chips, defects are far fewer, and they just throw out the bad ones.


The dead pixels on this LCD appear as green dots on the black background.

For example, on your Samsung panel that has a native resolution of 1,024 x 768, there are 786,432 pixels shining on the screen. Each pixel on a color TFT LCD is composed of three subpixel transistors; one for each color in the base color spectrum (red/green/blue), which then translates to 2,359,296 transistors in that panel. Now, this may or may not be all that many if you consider there are over 100 million transistors on an average Pentium 4 processor. However, with LCD transistors it's different, and the manufacturing yield of a pixel-perfect LCD panel is still extremely low compared to the high-yields chip vendors see. The odds of finding a pixel/transistor combination that is stuck on one color are far greater.

As a result, LCDs, as expensive as they are vs. tube monitors, would be even more expensive if manufacturers let only the pixel-perfect panels out the door. Also, a pixel that is working correctly today could very well fail tomorrow. LCD technology has come a long way, and you can find perfect panels out there. Also, different manufacturers have different dead-pixel policies.

The Samsung warranty policy you noted is not uncommon. However, recent pressure from Philips has caused Samsung to rethink its position. In Korea only, Samsung announced a zero-dead-pixel policy. This policy applies only to panels purchased after this announcement. So, it seems there is a move afoot in the right direction and a possible resolution to the issue in the future. The question to ask yourself is, "Can I really live with that one dead pixel?" Most end users, once they get over the initial annoyance, find that they don't notice even a couple of dead pixels because they only see them on certain color backgrounds. If you really need a pixel-perfect panel, you could put that Samsung up on eBay and buy a Philips panel. In the future, especially as LCD technology continues to evolve, dead-pixel tolerance will be a thing of the past. ▲

---

by Dave Altavilla and Marco Chiappetta,
the experts over at HotHardware.com.

For bonus content, subscribers can go to
www.cpumag.com/cpuapr05/q&a

Microengines

Batteries, Meet Your Potential Replacement

Jet engines are big. Cell phones are small. Finding a way to merge the two would appear to be as unlikely as your teenage son and daughter agreeing on what TV show to watch or what toppings they want on the pizza.

Maybe, then, it's not surprising that it took the brainpower of researchers at MIT's Gas Turbine Laboratory to make the connection. About a decade ago, Alan Epstein, director of this lab, began leading a team of researchers attempting to harness the power of gas turbine engines for handheld devices, and they're closing in on making this idea a commercial viability.

At first glance, this seems like an impossible task. After all, shrinking something that runs a jet engine to about the size of a quarter would seem equivalent to shoving an elephant in your coat pocket. Then again, technological advances always seem to make the impossible possible. Computers used to occupy large rooms; now you can carry a more powerful computer in a briefcase. Millions of transistors now fit on a tiny computer chip.

Microengines would run from battery-sized fuel canisters and could be the answer to keeping your cell phone or laptop batteries charged.

Powerhouse Batteries

At first, the MIT researchers expect the microengines to replace batteries in handheld devices and backpack-sized high-tech instruments, such as those that soldiers use. In fact, when Epstein began considering the idea of shrinking a jet engine in the mid-1990s, the Department of Defense was the first to come up with uses for the microengines. (Microengines are part of a growing field, called MicroElectroMechanical Systems, or MEMS, that focuses on microfabrication technology.)

Soldiers working in remote areas must carry large, heavy batteries to power their high-tech equipment. And they often work in conditions where electrical power to recharge the batteries is nonexistent or unreliable. By using a microengine to provide power to a device, soldiers could use fuel canisters to run it, negating the need for recharging. The fuel canisters would vary in size (about the size of a D battery) and would be designed differently for each device. Researchers at UC Berkeley, who are working on a similar project involving microengines, estimate that a microengine could generate about 10 times more power, pound for pound, than a rechargeable battery. Also, the fuel canisters that would power the microengine would be far cheaper to manufacture than a battery.

Although the technology behind rechargeable batteries has improved in recent years, batteries often struggle to generate enough power to run high-tech devices at an acceptable level, especially when compared to the amount of weight the batteries add to the overall package. Now think about the amount of power a jet engine must generate to propel an airplane into the air, and you'll understand the excitement MIT researchers feel about the potential of translating that power to microengines.

The Future

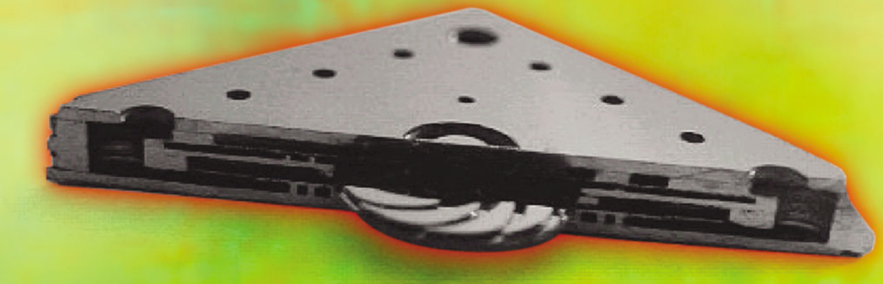
Researchers at UC Berkeley are hoping to further shrink microengines in the

Microengines At Work

The microengines currently in development aren't perfect. For example, microengines would emit a hot exhaust, which would make the devices difficult to carry in a pocket or close to the skin. The engines would also generate heat as they operate, but it would be no hotter than a rechargeable battery. UC Berkeley researchers also say microengines would emit carbon dioxide, but only about the same amount as one human breath.

MIT researchers estimate a cell phone or PDA could run on a microengine for up to 72 hours from a fuel cartridge no larger than a D battery. Each MIT microengine could generate 10 to 50 watts of power. UC Berkeley researchers say 1 cubic millimeter of fuel in a microengine could generate 1 milliwatt of power for one hour. To run larger devices, such as laptops, several microengines could be combined together, allowing them to work in tandem.

The microengine's blades (as pictured below), with a diameter close to that of a dime, would spin more than 1 million times per minute. A typical jet engine's blades



History Of Gas Turbine Engines

The idea of shrinking the gas turbine engine is only the latest in a series of developments and improvements for turbines and gas turbine engines that dates back more than 2,000 years.

150 B.C.

A man named Hero invented a machine that revolved on top of a boiling pot, using the steam from holes in the pot's lid to rotate blades. This is the earliest example of jet propulsion known today.

1500

Leonardo da Vinci sketched a device that would automatically rotate meat on a spit using hot gasses from a chimney.

1629

Giovanni Branca used steam to rotate a turbine used in operation of a machine (a stamping mill). This is the first practical application of a steam turbine.

1791

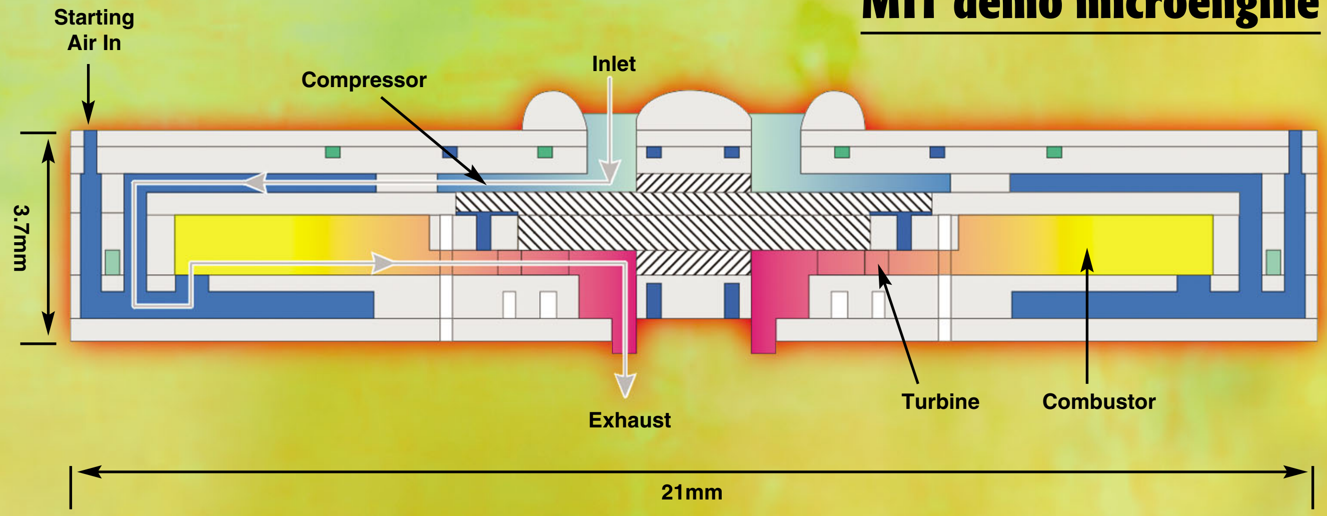
John Barber obtained the first patent for a turbine engine designed to propel a carriage. It used many elements found in today's gas turbine engines but still incorporated steam in the process, so it isn't considered the first true gas turbine engine.

future, possibly down to 1 square millimeter or smaller. Eventually the microengine, a sensor, and a controlling microprocessor all could fit on the same silicon chip. And, in time, they could be mass-produced, similar to computer chips today.

Whether microengines eventually replace all rechargeable batteries remains unknown; certainly, fuel cells will be a significant competitor. (For more on fuel cells and other types of battery chemistries, see "X-ray Vision: A Powerful Challenge" on page 38 in the September 2004 issue of *CPU*.) Either way, microengines and fuel cells would appear to provide a serious upgrade over today's rechargeable batteries.

MIT and UC Berkeley aren't the only organizations exploring miniature engines. Georgia Tech researchers are working with MIT researchers to create a microgenerator that would work in tandem with the microengine. In fact, a recent microengine demonstration at Georgia Tech produced 1.1 watts of power, which is enough to run some cell phones. In addition, Honeywell and University of Minnesota researchers are attempting to create a micropiston engine.

MIT demo microengine



spin at about 20,000 times per minute. Because it would use such tiny blades, the microengine must spin at far more revolutions per minute to allow the tips of the blades to reach the desired speed.

Under normal manufacturing circumstances, a normal-sized jet engine would consist of steel, copper, and other metals. However, to shrink the device and to create a microengine, the MIT researchers would etch the microengine on a wafer of silicon.

It's also important that the microengine be extremely flat (around 1/8 of an inch in thickness), which has caused some problems with generating the microengine's blades to the extremely tight tolerances. However, MIT and UC Berkeley researchers say they can solve the problems with tolerances.

Another problem researchers wrestled with was the long-standing notion that the combustion chamber of a gas engine had to be at least 18 inches long. Anything smaller would cause the burning gas to have extended surface contact with the cool walls of the combustion chamber, which scientists thought would extinguish the gas. Researchers eventually determined they could shrink the combustion chamber to make the microengine work either by keeping the chamber walls warm or by preheating the air that would mix with the fuel. Research on both ideas continues. ▲

Sources: MIT, American Society of Mechanical Engineers (ASME)

1872

Franz Stolze designed the first true gas turbine engine, but it never ran under its own power.

1903

General Electric started a gas turbine engine research division, led by Stanford Moss.

1914

Charles Curtis obtained the first U.S. patent for a true gas turbine engine. Curtis also invented the Curtis steam turbine engine.

1930

Frank Whittle obtained a patent for the first jet aircraft design.

1939

Germany's Heinkel aircraft company completed the first flight of a gas turbine powered jet aircraft, the HE178 model, on Aug. 27.

1941

Whittle began testing flights of his own jet turbine engines in England. At the same time, GE began manufacturing jet engines in the United States based on Whittle's design.

Sources: Gas-Turbines.com, NASA, About.com

Gas Turbine Engines: The Basics

A traditional gas turbine engine can provide power for many needs such as propelling a jet or creating electricity in a power plant.

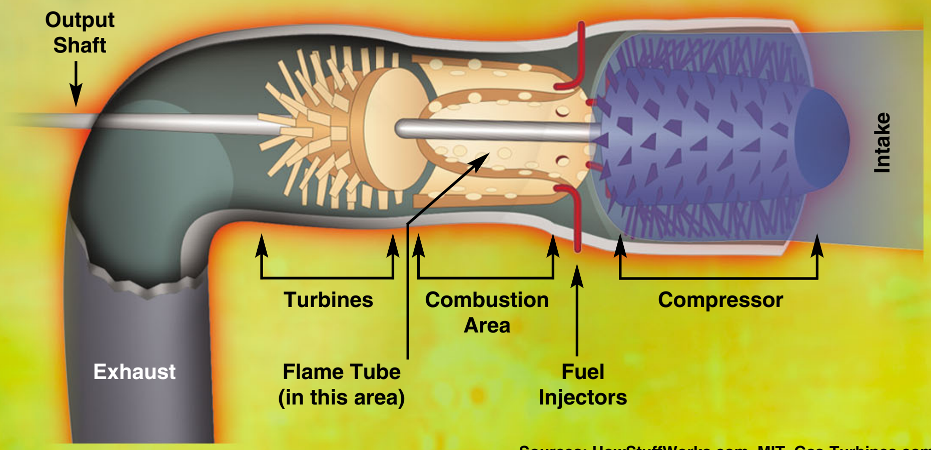
When a turbine spins, it can be configured to generate power. Many forces make the turbine spin. Water from a flowing river spins a turbine in a dam, for example, generating electricity.

In a traditional gas turbine engine, pressurized gas spins the turbine. The engine produces the pressurized gas by burning a fuel. As the fuel burns, it generates heat energy, which heats the surrounding air, causing the air to expand. As it expands, it rushes into the turbine's blades, causing the turbine—and anything connected to the turbine—to spin.

As you can see from this basic diagram, air enters the gas turbine engine through the intake, which is a hole in the engine. A compressor draws air from the outside through the intake. Most of the time, the compressor is a cylinder-shaped object that has fan blades sticking out of it. In addition to drawing air, the compressor compresses the air, adding pressure to it.

The pressurized air moves into the combustion area, where it mixes with fuel from the fuel injectors. The combustion area is a pair of cylinders called cans, which contain holes and slots that guide the compressed air into the inner can (containing the flame tube). Usually, an outer can and an inner can are used to prevent the compressed air from blowing out the flame.

The heated gas and the exhaust from the fuel and air reaction moves to the left, spinning the turbines. As the turbines spin, they turn the connected output shaft, which generates power. The gas and exhaust then continue in the exhaust pipe and are ejected from the engine. ▲



Sources: HowStuffWorks.com, MIT, Gas-Turbines.com

As an added benefit of microengines, handheld device manufacturers could be more willing to include more power-gobbling features in future models. Today, manufacturers often leave such features out because of concerns with short battery life. In the future, if power consumption becomes a minor problem for device manufacturers, we might see extremely powerful all-in-one handheld devices that can serve as cell phones, GPS devices, mini video players, and Internet-enabled PDAs.

MIT researchers expect to have commercial versions of their microengines available in three to five years. Fuel cells already are appearing commercially, but researchers feel the added power and fuel efficiency of microengines may give them a long-term edge.

If and when microengines gain a foothold in the industry, researchers foresee plenty of uses for them. Large clusters of microengines could end up powering a house in the future. Remote areas could generate power independently of power lines. Light bulbs could contain their own microengines, allowing for portable bulbs with no need for rewiring the entire home to move a light.

Microengines could take the idea of a wireless world to an entirely new level . . . much like jet engines took the world of airplanes to a new level.

by Kyle Schurman

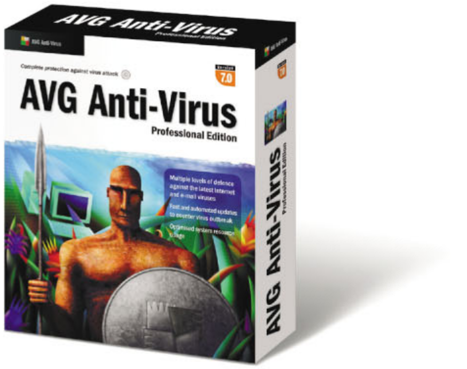
GRISOFT

AVG Anti-Virus

Who covers your back when it comes to virus protection?

With more then 20 million loyal users worldwide, Grisoft is the best choice for people and companies seeking maximum virus protection. With its easy and intuitive interface, Grisoft AVG anti-virus software doesn't bog down system resources; instead, it works quickly and seamlessly. Our singular focus on your protection lets YOU work - not worry.

Stop worrying and start downloading...
www.grisoft.com/redir/smartcomp



Single-Electron Transistors

SETs Hold Promise For Shrinking Devices

The sizes of the components that make a computer chip run—the transistors—are almost too small for humans to realistically comprehend.

Humans can easily understand the difference between dime-sized hail and softball-sized hail because they can make a real-world connection between the two. However, when a high-tech company says it has shrunk the size of a transistor to 90nm, most of us are at a loss to fathom the size. (For comparison, one micron is equal to 1,000nm, and the diameter of a fine human hair is about 50 microns.)

Bottom line: Transistors already are extremely small. And if researchers have their way, they'll shrink even more—eventually relying on a single electron to determine whether the transistor is on or off (its logic state). Furthermore, research is advancing to the point that the promise of SETs is becoming easier to see. If and when SETs become available, which would be at least a decade from now, you can expect the sizes and power requirements of devices to shrink significantly.

SETs Introduced

For several years, semiconductor designers have discussed the possibility of using SETs. SETs represent the finish line in the race to make transistors as small as possible. Because adding or subtracting a single electron will determine the logic state of the transistor, you could call SET technology "the ultimate miniaturization of a semiconductor."

A SET uses a quantum effect called tunneling to measure and control the movement

Quantum Tunneling

The idea of SETs becomes easier to understand with a brief explanation of one aspect of quantum physics: tunneling.

When considering the idea of tunneling, classical physics is unable to explain it because it's on an atomic scale. Classical physics explains everyday things, but quantum physics is required to explain things at the atomic level.

In this example of quantum tunneling, you can't use classical physics to explain the phenomenon.

The Classical Picture shows us that the electrical field will repel the electron as long as the electron's energy is less than the energy level of the electrical field.

Quantum physics, however, tells us that the electron exhibits many properties of a wave. (A wave determines the probability of where a particle will be.) When a wave encounters a barrier, most of the wave bounces back and is repelled. However, a portion of the wave leaks, or tunnels, into the barrier. If the barrier is thin enough and the wave is strong enough, the wave might tunnel completely through the barrier.

of any electron. Tunneling involves the process of a particle or a wave (usually an electron, as defined by quantum mechanics) making its way through a barrier such as an electronic field. (See the "Quantum Tunneling" sidebar for more information.)

One problem that plagued those who first experimented on SETs involved interference. The same thing that made SETs a desirable idea—use of a single electron to determine the logic state—also made them susceptible to interference from outside sources causing data errors. Many researchers avoided working with SETs because of this problem, called charge sensitivity.

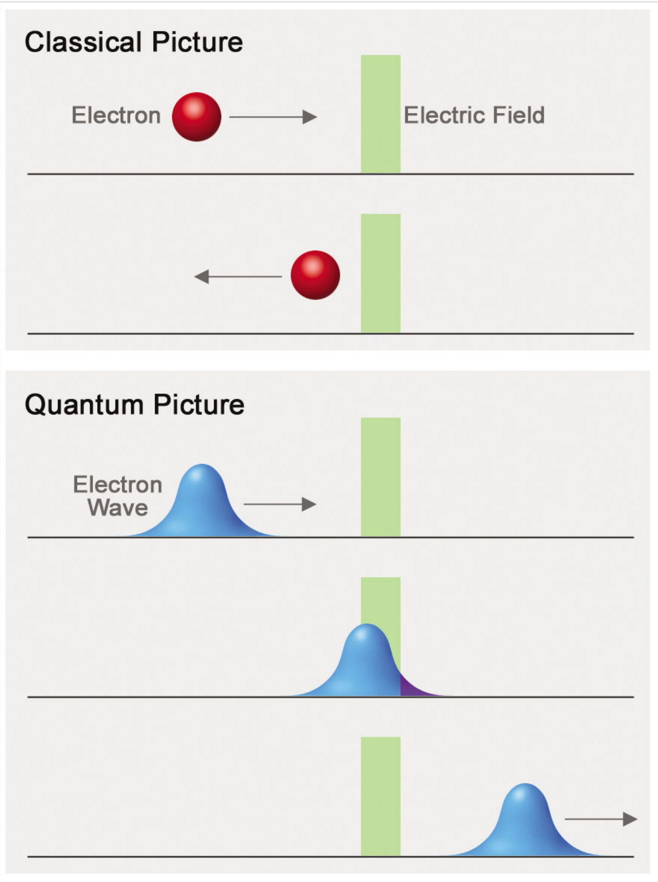
The interference, which can include background noise or electrical signals from nearby components or circuits, doesn't have to be overly powerful to knock the single electron out of place and affect a SET. Any trapped charge or charge that's in motion near a logic gate could cause the SET to flip its logic state, leaving the data unreliable. Most researchers agree that applying error-correction techniques to the SET to negate charge sensitivity problems would be nearly impossible because of the randomness of the strength of the background noise and interference that can affect the data.

TI's Research

Researchers from Texas Instruments, led by Christoph Wasshuber, believe they have solved the charge sensitivity problem affecting SETs. Wasshuber worked with researchers at the Swiss Federal Institute of Technology in Lausanne, Switzerland, and the U.S. Air Force Research Lab to develop a version of a SET that makes use of normal silicon circuitry, thereby lessening problems from interference. The TI researchers also used a particular characteristic of the SET to measure the logic state that is unaffected by charge sensitivity problems.

The researchers say CMOS (complementary metal oxide semiconductor; CMOS technology involves using two types of circuits—a positive polarity and a negative polarity—within the transistor to lower power consumption) technology and SETs eventually would work in combination. Wasshuber and other researchers think this combination gives SETs the best chance for success. CMOS technology is common in today's transistors. Because this type of SET relies on standard circuitry, manufacturers should be able to continue using the types of fabrication processes and equipment they're currently using, thereby saving billions of dollars in investments in new equipment.

As CMOS technology advances, it allows for smaller and smaller components. However, Wasshuber and other researchers expect CMOS technology to reach its size limit within 10 to 15 years. At a recent symposium, IBM official Bill Rozich



Classical physics explains everyday things, but quantum physics is required to explain things at the atomic level

Sources: PhysicsPost.com, University of Washington (Theoretical Chemistry Group)

Another way to think of tunneling is to use real-world items. Say you have a rubber ball. If you throw the ball against a cement wall, it will bounce back every time; you don't have enough energy to throw it through the wall, and it's too large to tunnel through the wall. Now let's say you're throwing the ball at another wall, but this wall is like a thin piece of Swiss cheese with huge holes in it. At some point when you throw the ball, it will go through the wall. The same thing happens at the atomic level when you're discussing an electron tunneling through an electrical field. Because the electron is tiny and the electrical field has gaps between the atoms and particles, at some point, the electron might find its way through the wall.

As shown in the last part of the Quantum Picture, as the electron wave encounters the electrical field, it has a chance of tunneling through the field. ▲

estimated the end of the line for improvements in CMOS technology as 2020.

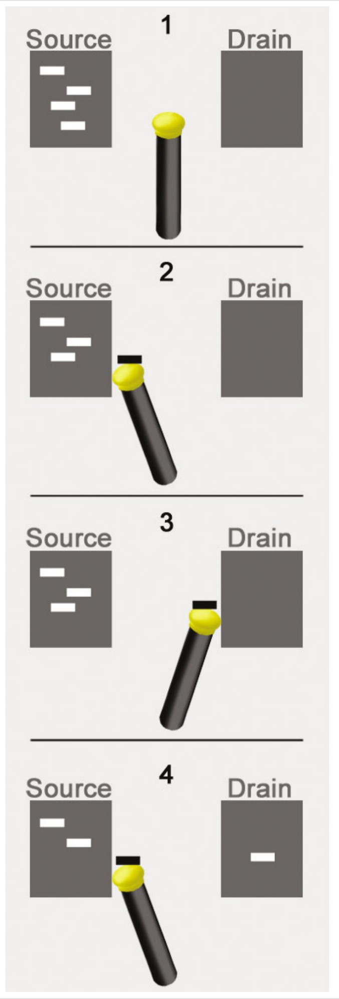
At that point, SET could combine with CMOS to allow manufacturers to continue shrinking the chips. One such configuration might have CMOS components performing certain tasks, such as I/O, while the SET components would perform all other tasks.

Other Research

Researchers at the University of Wisconsin-Madison and at the Ludwig-Maximilians University in Munich, Germany, worked together to develop a SET that uses a vibrating arm to determine the logic state.

The vibrating arm is built on a nanometer scale and is less than 1 millionth of an inch long. (See the "SET At Arm's Length" sidebar for more information.)

The researchers expect their type of SET to spur advancements in several areas, including smaller chips,



SET
At Arm's Length

The type of SET developed by Robert Blick of the University of Wisconsin-Madison and Dominik Scheible of Ludwig-Maximilians University in Munich uses a vibrating silicon arm that's less than 1 millionth of an inch long.

When the SET is in the zero or off logic state, the vibrating arm doesn't move and has no contact with either the source or the drain in the transistor (as shown in figure 1). Therefore, no electrons leak between the source and drain. Electron leakage is a problem with standard transistors.

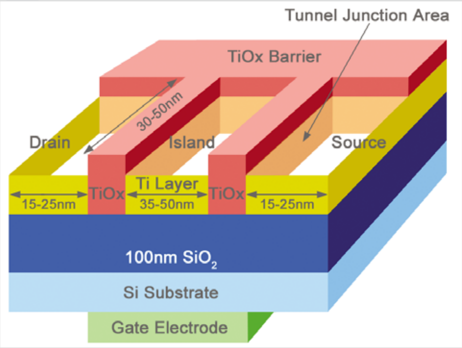
When the SET is in the one or on logic state, voltage is applied to the source, which causes the arm to begin vibrating at a frequency up to 400 million cycles per second between the source and drain (which are two electrodes). At the tip of the arm is an island, which is made of gold. As the arm vibrates, the island makes contact with the source, and a single electron moves from the source onto the island (figure 2). The island is only large enough to hold a single electron. As the arm moves the island across the gap, the presence of an electron is noted, and the transistor is recorded with an on logic state. The island then makes contact with the drain (figure 3) and releases its electron. The entire process then begins again, with the island returning to the source for another electron (figure 4). ▲

Source: University of Wisconsin-Madison

SET
Schematic

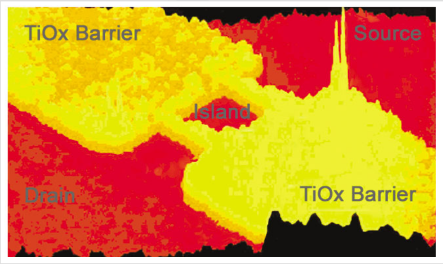
The schematic diagram of one type of SET, as shown in the diagram below, illustrates the tiny components that make up the SET.

The Si (silicon) substrate serves as the base of the SET. A 100nm-thick (SiO2) silicon dioxide layer sits above the Si substrate. Next is a 3nm-thick Ti (titanium) metal film, sitting atop the silicon dioxide layer, along with a TiOx (titanium oxide) barrier.



The island then is formed between titanium oxide barriers. The narrow TiOx lines serve as the tunneling junctions for the SET and typically are 2 to 3nm in width.

The gate electrode controls the flow of electrons, determining the zero or one logic state. For a zero logic state, no electrons flow through the island. For a one logic state, the single electron moves from the drain area, tunnels into the island, and then tunnels to the source area. ▲



(NOTE: The above image is an overview of the island region of an SET.)

Sources: MITRE Nanosystems Group, Texas Instruments, Stanford University lower power consumption among handheld devices, and improved life and performance for remote sensors.

Make Use Of SETs

Most analysts and researchers say the first devices to make use of SETs will be devices for testing electronic circuits and memory chips. The SET-based memory chips will be especially impressive if the analysts' forecasts are correct: One square centimeter of silicon featuring SETs could have a data density about 100 times what's available with today's transistor technology.

Under the ideal scenario, SETs will work their way into more and more devices near the middle of the next decade. By that point, traditional transistors will be in need of a change. With billions of transistors placed on the typical chip in the next few years, heat generation and power consumption problems will be greatly magnified. Researchers estimate a SET would require about 10% of the power a traditional transistor requires. Heat generation would shrink considerably, as well, because far fewer electrons would be moving through the transistor's circuits. (Energy generated when the electrons move through the transistors is released as heat.)

Although the possibilities for SETs are exciting, some researchers are skeptical about the real-world functionality of them. Some say the designs for SETs simply aren't practical without major improvements in several related technologies, which may never happen. For example, some of the components needed to make SETs work will need to be around the size of a molecule—vastly smaller than what's available today.

However, progress toward SETs is moving forward, and several companies, including TI, are collecting patents related to SETs. These companies might not see the benefits from their research for another decade or so, but if their forecasts are correct, SETs will become big business—regardless of their actual size.

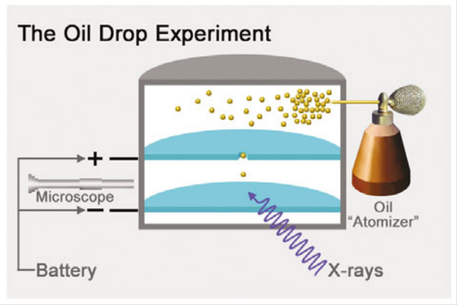
by Kyle Schurman

SET
Discovery Timeline

Several discoveries and experiments during the past 100-plus years have led to today's developments concerning SETs.

1897 Joseph John Thomson, a British physicist, performed experiments on atoms and discovered the electron.

1909 Robert Millikan performed The Oil Drop Experiment and measured the negative charge of the electron. In the experiment, an atomizer sprays a fine mist of oil droplets into a chamber. A hole in the chamber allows some droplets to fall into a lower chamber. By applying an X-ray to the lower chamber, Millikan could use a battery to measure negatively charged electrons leaving the air in the lower chamber (because of the X-rays) and attaching themselves to the oil droplets.

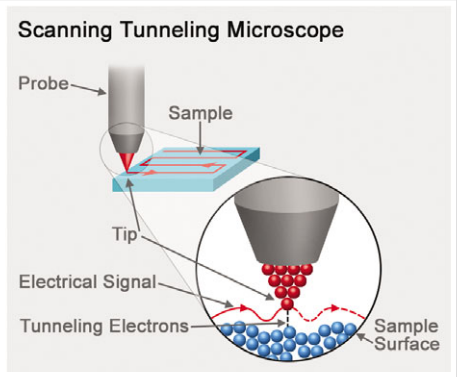


1948 Researchers at Bell Laboratories invented the bipolar junction transistor as part of an effort to replace vacuum tubes with solid-state devices, thereby greatly reducing power requirements. SETs also would greatly reduce power requirements over today's traditional transistors.

1951 Cornelis Gorter introduced the Coulomb blockade effect, which explains the increase of the low-temperature electrical resistance of granular metallic films. The Coulomb blockade effect is a key aspect of SETs.

1963 Frank Wanlass invented the CMOS circuit at Fairfield Semiconductor. CMOS has grown into a dominant technology in digital integrated circuits.

1981 Gerd Binnig and Heinrich Rohrer developed the scanning tunneling microscope, which obtains atomic-scale images and 3D profiles of metal surfaces. The microscope takes advantage of tunneling, which is an important aspect of SETs. When the tip of the probe nears the surface, electrons tunnel between the extremely sharp tip (which consists of one atom) and the surface, which creates an electrical signal. By maintaining the strength of this electrical signal, the probe can move up and down to remain an exact distance from the surface and accurately measure the surface as it moves across the surface.



1998 Hitachi announced a prototype of a 128Mb nonvolatile SEM (single electron memory). To store data, Hitachi's SEM uses the Coulomb blockade effect to trap electrons in each memory cell. ▲

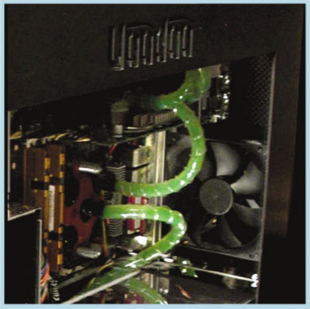
Sources: NobelPrize.org, American Institute of Physics, The Big 10 Science Experiments, Principles of Semiconductor Devices, Gorter Foundation, Hitachi, Texas Instruments

dream pcs

Leaders Of The Pack

56 Falcon Northwest

59 Maingear



62 Voodoo PC

67 Mobile Dream PCs

It's that time of year again: The snow melts, flowers push their way through the leaves we forgot to rake last autumn, and more than $16,000 just walked through *CPU*'s doors. Spring has arrived, and so has our annual trio of top rigs—the Leaders Of The Pack. We review everything from budget PCs to screaming-fast systems all year long, but once a year we call three companies that represent the upper echelon of the custom-built PC industry and tell them what they've been waiting to hear: "We're going to take tons of pictures."

The members of this year's pack all make powerful systems that tackle today's most demanding video games head-on, but we didn't base our builder selection on power alone. Falcon Northwest, Maingear, and Voodoo PC consistently produce eye-popping rigs and

"we fired up each system and made it sweat"

have built their reputations on innovation and attention to detail. Although large PC manufacturers seek out inexpensive components for budget-friendly systems and then squeeze them into slim towers, our pack takes the opposite approach. These builders hunt down the components that best fit their dream systems and then place them in large, custom cases. They research (and, in Voodoo's case, develop) cooling equipment. They develop origami cabling techniques. They have automotive finishes in-house. After all, they build luxury computer systems.

This showcase has only one rule: The builders must offer every feature to customers via their online stores. With that in mind, the custom builders packed the best items into their newest case designs. Like last year, Maingear and Voodoo se-lected liquid cooling systems (Voodoo somehow developed an even smaller system this year). Falcon stuck to its tried-and-true Zalman heatsinks, which are quiet and cool wonders. That said, don't expect to see the same Mach V that graced our pages this time last year—the new system's slick exterior includes gold leaf logos.

Of course, those heavy-duty fans and watercooling systems aren't just window candy. We fired up each system and made it sweat. All three builders target these graphics-heavy systems at gamers, so we loaded Futuremarks' famous 3DMark benchmarks, which stress the system's graphics card. We skipped the aging 3DMark 2001, but we kept 3DMark03 in the ring for readers who haven't yet switched to the latest version, 3DMark05. The new 3DMark drops its predecessor's sound tests but offers a new lineup of intense graphic demos and requires DirectX 9.0c.

We also lined up three of the latest video games: Doom 3, Far Cry, and Half-Life 2. These games are hits, but it's their system-crushing graphics that makes them such worthy tests. We watched these games pound systems through the end of 2004 and into 2005, so we're excited to see these new systems, two of which boast dual NVIDIA GeForce 6800s, a la SLI, take them on. NVIDIA's list of SLI Certified software includes all three games, which means that the SLI setup affects the game's performance. We ran Doom 3's and Far Cry's built-in demos to determine each system's frame rates and used our own Half-Life 2 demo file. We closed our benchmark sessions with hands-on testing: playing video games (for far too long), listening to CDs, and watching portions of "The Matrix" on DVD.

We round up these systems every year for several reasons. For one thing, this gathering of silicon and aluminum lets us compare the champions of today to the champions of yore. It also lets the builders show us their perspectives on the latest technology—although all three systems share some identical components, the rigs look almost nothing alike and attract buyers from different areas in the luxury market. And we certainly can't complain about having three of the hottest rigs of the year in one room. But most importantly, we want to introduce you to this year's new show horses. If you're buying, you may find your next PC within the next several pages. If you're building, you may find inspiration. And if you're just looking, well, you'll find what you're looking for.

(For our complete benchmarks, go to www.cpumag.com/cpuapr05/pack.)

The three desktop PCs in the following pages are tough customers that handle serious data crunching and gaming, and although they aren't nearly as noisy as the heavyweights of old, they're not silent either. In short, they belong on your desk, not in your living room. But just before we put this issue to bed, a contender in a burgeoning market burst through our doors. This system wants nothing to do with your video games or your spreadsheets. In fact, it doesn't even want to see you when you're working: It'll wait in the living room until you're ready to flop on the couch, kick off your shoes, and listen to music or watch some prerecorded TV.

Meet the DHS 2, Alienware's low-profile media center PC. Although we didn't have time to give this rig the vigorous testing it deserves (and will receive in our standard hardware review online by the time you read this), we couldn't wait to put it in our photo studio and start shooting pics. We share our sneak peek with you on page 65. ▲

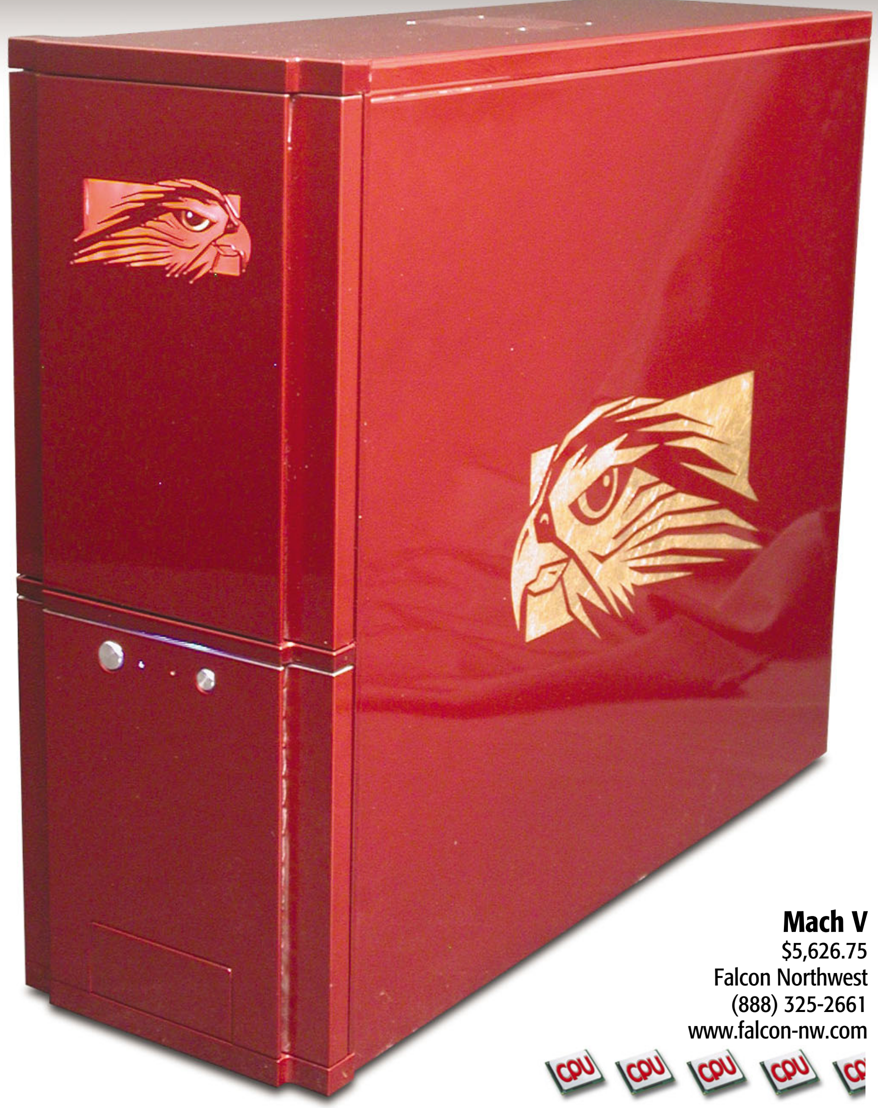
---

by Joshua Gulick

Graphics & Design by Andria Schultz & Fred Schneider

Falcon nor

if goldfinger had a gaming rig

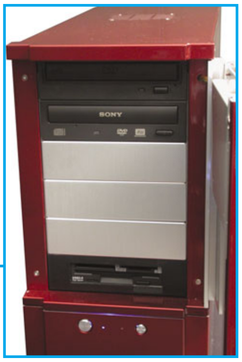


Mach V
$5,626.75
Falcon Northwest
(888) 325-2661
www.falcon-nw.com
CPU CPU CPU CPU CP

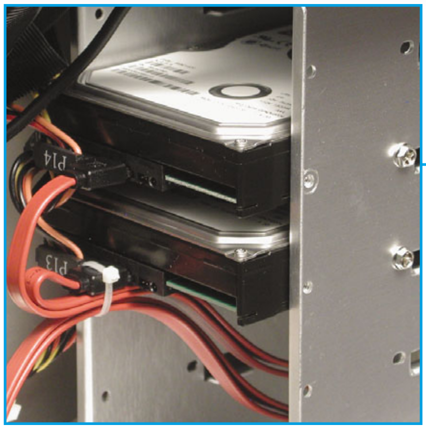
Custom builders across the country offer great PC paint jobs, but if you want to transform your study into a gallery, Falcon Northwest should be at the top of your list. The Medford, Ore.,-based builder's artists see your system as an aluminum canvas, and they have years of creating awe-inspiring works under their collective belt. Falcon offers an array of automotive finishes, designs, and artwork for its systems' exteriors. That's not to say that Falcon doesn't offer other popular case mods: It tackles case lighting with the same creativity and neurotic need for perfection that makes its paint jobs shine. As a result, customers with large wallets can buy systems that sport both paint jobs and lighting—beasts that dominate the room day and night.

Of course, these high-end customizations are luxury items, so it's only fitting that our review system sports both. In fact, when we told the three builders that money wasn't an object, Falcon immediately thought of one of its latest customizations: gold leaf. After all, why limit yourself to high-quality automotive finishes when you can paint with gold? Falcon used the gold leaf technique when it painted the company's logo onto not one, but both sides of our review PC. "The gold leaf is just one of a million looks in our artist's arsenal," says Kelt Reeves, president and founder of Falcon. "It's tricky to apply because it's so fragile before it gets sealed in the clearcoat. It's a capability few customers even know we have."

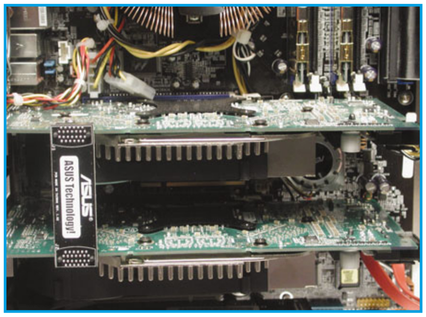
But the gold leaf logos are merely icing on the cake.



The Mach V has two optical drives and a media reader and still boasts upgrade potential. The wire that leads from the front panel to the front door powers the door's lighted Falcon logo.



At first glance, the two drives aren't imposing, but these Maxtor DiamondMax 10's make up over half a terabyte of storage space.



Video cards. That's right—cards, not card. Welcome to NVIDIA's SLI. The Mach V sports two GeForce 6800 Ultra cards.

Every inch of the exterior sports a brand-new Exotix paint job that will catch your eye (after the gold leaf draws you in for a closer look, that is). Long, dark splinters sprinkle across the metallic maroon paint, creating a broken-glass effect. We were surprised to find that Falcon's artist did not simply return to the dried maroon paint and then apply the shadows; they're part of the maroon paint. "That's a paint effect using special chemicals that dry, harden, and 'crack,' leaving behind different shadings," says Reeves.

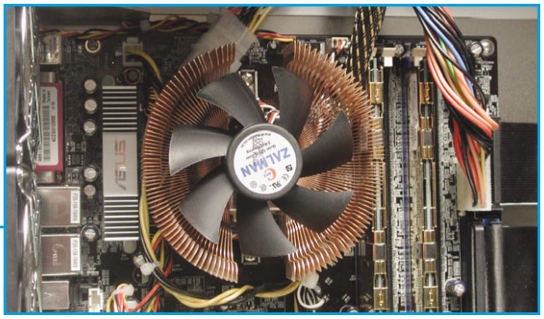
Falcon also added its famous LaserWorks mod. When Falcon sent us its dream system for this same article last year, it built an orange, lighted Half-Life 2 logo into the side of the case that almost (but not quite) outshined the painting of Gordon Freeman carrying his crowbar through a shattered city. This year, the lighted Falcon logo again rivals the case's paint job for sheer coolness; the laser-cut eagle shines in a lighted room but really comes to life when you turn off the lights.

As slick as the Mach V's exterior is, it's little more than fancy wrapping paper if the Mach V's insides can't back it up. To that end, Falcon chose ASUS' brand-new AMD-based A8N-SLI Deluxe. (So did every other builder in this article, it seems—we can't imagine why.) AMD-based boards finally support PCI Express, and thanks to NVIDIA's nForce 4 SLI chip, the A8N supports up to two identical video cards that toil together to bring your favorite video games to life. Customers don't have to stock their rigs with two NVIDIA GeForce 6800 Ultras, but Falcon isn't one to waste space in a dream system.

That said, Reeves points out that you shouldn't skip SLI-based systems when building midrange systems, even if your budget doesn't have room for two cards. "But it's important for people to know that SLI-ready systems with one 6600 GT start at price points not much more than other single-card systems," Reeves says.

The board also supports the AMD's enthusiast processor family, the Athlon 64 FX, so Falcon popped a 2.6GHz FX-55 into the system and cooled it with a Zalman CNPS7000B-Cu. Falcon recently switched to Zalman's latest CPU heatsink, the 90mm CNPS7000AlCu that sports a blue LED, and won't it offer the older model by the time you read this.

So why does Falcon stick to aircooling when it puts together AMD systems? It's all about the overclocking. "With good aircooling you can get 2.7[GHz] on most FX-55s, but even with the best watercooling maybe only one in 10 FX-55 chips might be able to get 2.8[GHz]," says Reeves. "50 to 100MHz just doesn't usually justify the expense and risk of watercooling. With Intel, watercooling



Falcon overclocks the FX-55 just a little (from 2.6 to 2.69GHz), but the extra heat shouldn't affect the CPU's reliability, thanks to the large, all-copper Zalman heatsink.

thwest

really taps the headroom Intel usually leaves on the table. Watercooling makes a lot more sense on Intel."

The system builder also tossed 1GB of OCZ Gold Edition memory and more than half a terabyte of storage into the Mach V. The two 300GB Maxtor DiamondMax 10s each have 16MB cache. Falcon chose the speedy RAID 0 configuration. Although the mobo's eight-channel Realtek ALC850 audio codec isn't half bad, Falcon opted for the tried-and-true Creative Labs Sound Blaster Audigy 2 ZS.

Falcon treats its customers to super-caffeinated coffee (for those late-night gaming sprees), a mug, T-shirt, and mousepad. It backs up the Mach V with one year of overnight technical support, a three-year warranty, a customized rescue disk, and toll-free tech support. ▲

This chassis sticks to the standard ATX layout, but we're not complaining. The case boasts two sturdy front doors and a removable motherboard tray.

Falcon Northwest Mach V Specifications

CPU	2.6GHz AMD Athlon 64 FX-55 at 2.69GHz
Motherboard	ASUS A8N-SLI Deluxe
Chipset	NVIDIA nForce 4 SLI
RAM	1GB OCZ Gold Edition Rev. 2 PC3200 OCZ4661024DCGER2-K (512MB x2)
Hard Drive	300GB Maxtor DiamondMax 10 SATA 7,200rpm 16MB Cache (x2; RAID 0)
Graphics	256MB NVIDIA GeForce 6800 Ultra PCI-E (x2)
Sound	Creative Labs Sound Blaster Audigy 2 ZS
NIC	Integrated Gigabit LAN (x2)
Optical Drive	Toshiba 16X DVD-ROM SD-M1912
Optical Drive	Sony DRU-710A 16X/4X/16X DVD±RW, 2.4X DL DVD+R, 48X/24X/40X
Media Reader	Mitisumi FA404M 7-in-1 CF/MD, SM, SD/MMC/MS, Floppy
PSU	600W Enermax Noisetaker 2.0 EG701AX-VE(W) 24-Pin
Cooling	Zalman CNPS7000B-Cu heatsink/fan
Chassis	SilverStone Icon Aluminum
Keyboard	N/A
Mouse	N/A
OS	WinXP Pro
Extras	Everglide Mousepad, Falcon Fuel Coffee, Gold Leaf Logo, Mug, T-Shirt
Documentation	Benchmarks, Customized Setup Poster, Maintenance, Rescue Disk Instructions, Shipping/Quality Checklists, Tech Specs, Warranty Info
Warranty/Support	Falcon Warranty (3 years), Falcon Overnight Service (1 year), Rescue Disc 2, Toll-Free Tech Support
Price	$5,626.75

Benchmarks	
SYSmark 2004	218
SYSmark 2004 Internet Content Creation	242
SYSmark 2004 Office Productivity	197
3DMark03 Build 3.6.0	21204
3DMark05 Build 1.2.0	9627
Doom 3 (Ultra Quality 4XAA 8XAF)	
800 x 600	60.5
1,024 x 768	59.5
1,280 x 1,024	59.8
1,600 x 1,200	55.37
Far Cry Patch 1.31 (Very High 4XAA 8XAF)	
800 x 600	60.51
1,024 x 768	59.91
1,280 x 1,024	74.14
1,600 x 1,200	74.01
Half-Life 2 (High 4XAA 8XAF)	
800 x 600	89.99
1,024 x 768	89.92
1,280 x 1,024	84.92
1,600 x 1,200	71.06

maingear

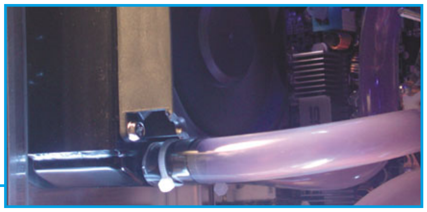
tinted windows but nothing to hide

F131 Type 2
$4,498.11
Maingear
(888) 624-4327
www.maingear.com

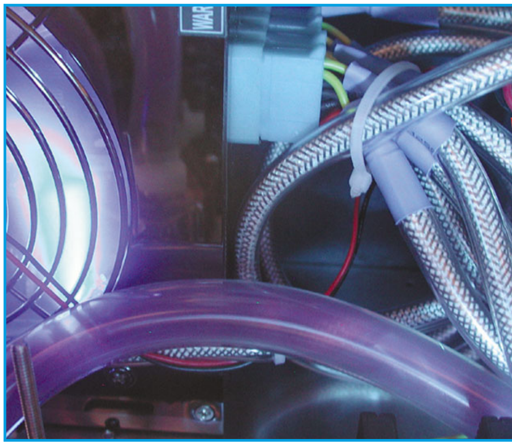
This system builder debuted in our "Return Of The Pack" (April 2004; page 46) article last year with the BEAST, an enormous system that carried its own phase-change system and a watercooling system. The BEAST towers above Maingear's latest contender, but the New Jersey-based system builder has as much confidence in the (much) smaller F131 Type 2 as it had in the BEAST. Although the BEAST offered unbridled power, the F131 balances speed against size, noise level, and cost. And by cost we mean only that it costs less than its $8,092; the F131 still breaks banks at $4,498.

Maingear prides itself on building speedy systems that handle CPU and graphics-intensive tasks with ease, but, as with the other builders in this pack, it doesn't jeopardize component warranties when pursuing those extra benchmark points (in other words, it's confident that the system won't fail due to overclocked settings). Of course, customers don't rely solely on component warranties anyway; the system includes a one-year onsite warranty. "This review system is a reflection of our real-world performance and the way we ship our system to [*CPU*] is no different in configuration than that of our customers," says Wallace Santos, Maingear's vice president. "We're not about showing off, we're about making the best gaming PCs the public can buy."

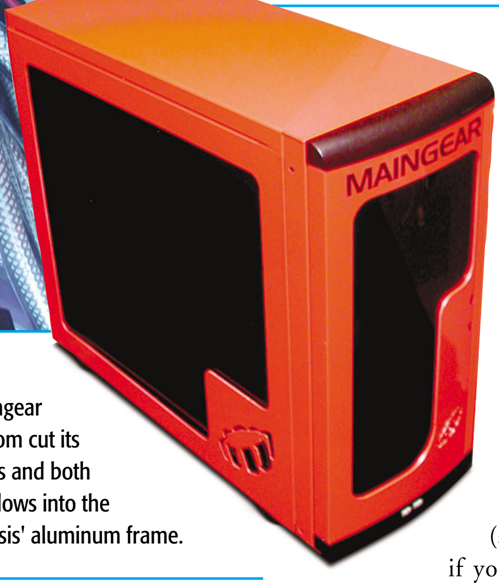
As with Falcon Northwest, Maingear offers its customers high-quality finishes including automotive paint. Our review unit sports Maingear's Inferno Red paint job. Maingear also applied the paint to the Logitech Elite Keyboard and Logitech Wireless Mouse—a nice touch. Maingear used a waterjet technique to cut windows into the side panel and front door and covered both with tinted Plexiglas, a customization that makes the dark-red system all the more sinister. We like the front door window, in particular, as it lets you clearly



Maingear tucks the small radiator just under the power supply fan.



We like OCZ's modular power supply, which lets you attach only the cables you need. Of course, feature-packed systems such as the F131 Type 2 require plenty of cables.



Maingear custom cut its logos and both windows into the chassis' aluminum frame.

see the system's front panel LCD and the watercooling reservoir. Maingear also applied the same waterjet/Plexiglas treatment when it added its logo to the front door and side panel.

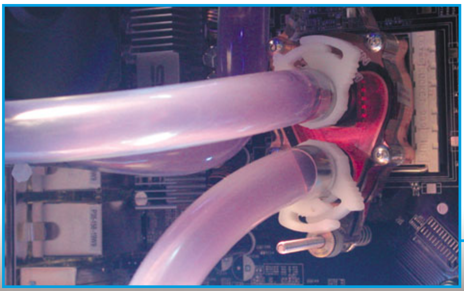
The front-panel LCD offers two rows of bright-blue text. Our review unit displayed the system's CPU and video card model numbers, but Maingear can program the LCD "to display a variety of things from mainboard temps and CPU temps to local news and the song you're currently playing in Winamp," Santos says. The device pulls news from BBC World and CNN. But that's not the front panel's only perk: The watercooling system's reservoir fills two of the three external 3.5-inch bays (a media/floppy reader stands in the bay above the reservoir). Bubbles flow into the reservoir, making it even more eye-catching. The front panel location isn't just for show; you can easily slide the reservoir out of the front panel if you need to perform maintenance.

Just as Falcon bent the rules a little last year by adding a paint job that wasn't yet available to customers, Maingear bent the rules by putting a reference video card into its system. That said, the card in question is a 256MB ATI X850; we weren't disappointed to get a chance to see it. At the moment, the card sports a rather noisy fan, but Maingear plans to extend its watercooling system to the card for customers. As we go to print, Maingear doesn't yet offer the X850, but Santos assures us that it will have the production models in stock long before the issue reaches you.

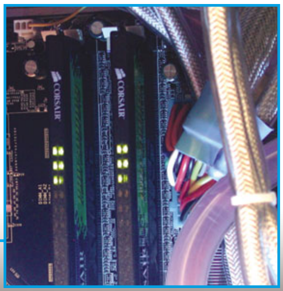
We were surprised to see that Maingear chose the same ASUS A8N-SLI Deluxe that the other builders in this article offer: After all, ATI cards don't support SLI. As a result, you can't upgrade to a dual-card system by simply buying another X850—you'll need to toss your card and start from scratch. Well, almost from scratch. As Maingear points out, the motherboard handles the ATI card without any trouble, and that means you won't need to switch chipsets (and possibly reinstall your OS) if you later switch to an SLI setup. Maingear also offers systems that have SLI configurations.

If you like a little bling-bling in your system, you'll appreciate the two 512MB Corsair XMS PC3200 DIMMs, which have rows of colored LEDs. Speaking of bling-bling, the system also boasts a single, white cold-cathode light that runs across the bottom of the system. The cathode lights up the watercooling system's hoses. Thanks to the watercooling system's pink liquid, you'll see bright-red veins when you look through the Plexiglas window in a dark room.

The F131 doesn't offer as much storage space as Falcon's Mach V, but the Maingear system has a slick setup: two 74GB Western Digital 10,000rpm



A copper DangerDen waterblock cools the Athlon 64 FX-55. Maingear's cooling mixture is naturally red, which makes it a great fit for this Inferno Red chassis.



Two 1GB Corsair XMS DIMMs light up the F131 Type 2's interior. The LEDs flash as your system crunches data.

If you're a watercooling enthusiast, you'll love this reservoir. You won't need to refill the reservoir anytime soon, but when you need to access it, you can simply pull it from the front of the PC.

drives in a striped array and a 250GB Western Digital 7,200rpm drive that stores your non-OS files. Not surprisingly, all three drives have SATA connections. Maingear overclocked the 2.6GHz FX-55 to a respectable 2.73GHz.

Maingear wrapped up its PC with a Creative Labs Sound Blaster Audigy 2 ZS and two external drives: an LG CD-RW and a DVD-RW. Both devices are black, which means you won't see them when peering through the front door. Maingear offers a one-year warranty and toll-free tech support. ▲

The F131 Type 2 sports two optical drives: a CD-RW and a DVD-RW.

Maingear F131 Type 2 Specifications

CPU	2.6GHz AMD Athlon 64 FX-55 at 2.73GHz
Motherboard	ASUS A8N-SLI Deluxe
Chipset	NVIDIA nForce 4 SLI
RAM	1GB Corsair XMS PC3200 CMX5 12-3200LLPro (512MB x2)
Hard Drive	74GB Western Digital WD74 SATA 10,000rpm (x2; RAID 0); 250GB Western Digital SATA 7,200rpm
Graphics	256MB ATI Radeon x850 PCI-E
Sound	Creative Labs Sound Blaster Audigy 2 ZS
NIC	Integrated Gigabit LAN (x2)
Optical Drive	LG GCE-8526B 52X/32X/52X CD-RW
Optical Drive	LG DVDRAM GSA-4160B 16X/4X/16X DVD±RW, 2.4X DL DVD+R, 40X/24X/40X
Media Reader	Maingear Media Reader (w/Floppy)
PSU	600W OCZ OCZ600ADJ (Universal Connector)
Cooling	Maingear Watercooling Kit
Chassis	Maingear Type 2 Aluminum
Keyboard	Logitech Elite Keyboard (Inferno Red)
Mouse	Logitech Wireless Mouse (Inferno Red)
OS	WinXP Pro
Extras	Inferno Red Paint
Documentation	Benchmark Scores, Binder, Tech Specs, Setup, Troubleshooting, Warranty, System Recovery
Warranty/Support	Maingear Onsite Warranty (1 Year), Toll-Free Tech Support
Price	$4,498.11

Benchmarks

SYSmark 2004	211
SYSmark 2004 Internet Content Creation	239
SYSmark 2004 Office Productivity	186
3DMark03 Build 3.6.0	13397
3DMark05 Build 1.2.0	6267

Doom 3 (Ultra Quality 4XAA 8XAF)

800 x 600	88.5
1,024 x 768	70.1
1,280 x 1,024	50.5
1,600 x 1,200	36.9

Far Cry Patch 1.31 (Very High 4XAA 8XAF)

800 x 600	113.33
1,024 x 768	100.64
1,280 x 1,024	70.37
1,600 x 1,200	54.6

Half-Life 2 (High 4XAA 8XAF)

800 x 600	97.45
1,024 x 768	95.56
1,280 x 1,024	63.8
1,600 x 1,200	26.33

Voodoo PC

The Witch Doctor Goes To Town

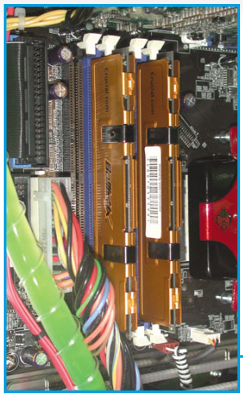
As with the other builders, Voodoo chose the lauded FX-55. It cools the CPU (and just about everything else) with its custom liquid cooling system.

Rage F:5
$6,057.70
Voodoo PC
(888) 708-6636
www.voodoopc.com

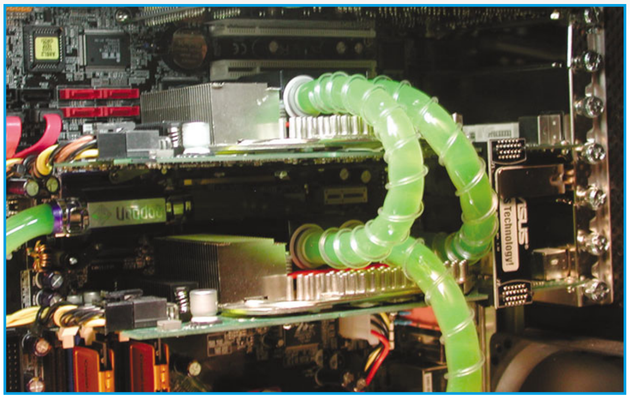
Based in Calgary, Canada, Voodoo PC is the only builder in the pack that doesn't hail from the United States. But that hasn't stopped the custom builder from flooding our end of the continent with high-powered, heavily customized systems since 1991. (In fact, Voodoo and Falcon began selling computers only months apart from each other.) Although Voo-doo offers high-quality paint jobs, it focuses on tweaks—lots of tweaks. Voodoo's brightest customize everything from popular components, such as cooling equipment, to items that rarely receive attention from other vendors such as side panel latches. Trust us, if your PC's side panels rattle, you'll want to take a look at the new Rage F:5's chassis.

Lian-Li and Voodoo collaborated on the F:5's chassis, so if you've seen Lian-Li's V1000 chassis you'll recognize several features when you open the F:5. For one thing, the removable motherboard tray is on the case's right side, which means builders must flip the motherboard upside down to point the ports toward the back of the computer. As a result, the power supply sits at the bottom of the case instead of the top, and a shield separates various components.

The F:5 chassis isn't a V1000 clone, however. Voodoo replaced the chassis' wheels with the same rubber feet that it put on previous Rage versions. The feet, which have Voodoo logo treads, prevent the system from slipping and



Voodoo added 1GB of Crucial Ballistix memory, but you can add two more DIMMs if you want to upgrade.



Video cards. Forget the GeForce Ultra's fans—we're surprised Voodoo didn't cook up a way to liquid cool the system's PSU.

(just as important) reduce vibrations. Voodoo also applied its BAM (Brushed, Anodized, Machined) finish and cut its logo into the top of the case. Thanks to red Plexiglas and some well-placed lighting, the logo is a beacon to gamers in dark LAN party rooms and is almost (but not quite, in our opinion) as cool as the lighted Voodoo eyes that peek over the media card reader on the front panel.

Voodoo also customized the inside of the case, which was unusual before Voodoo attacked it. The result: a chassis that best meets its users' needs. "We found a huge portion of our customers only purchase two optical drives and a significant amount purchase a Creative Platinum," says Trentent Tye, who headed up the Rage F:5 team. "So we designed the case to reflect our audience and minimize the waste by only including three 5.25-inch drive bays and a hidden one above all other components for the reservoir." Voodoo also added a mirror finish to the dividing panel, a touch that lets you admire the colorful components from a different angle.

One of the things we like most about this system is its versatility. Voodoo designed the case and the liquid-cooling system to accommodate both today's popular setup (an Athlon 64 FX-55 and dual SLI cards) and future configurations. "With this cooling system, we have enough head room that liquid cooling a dual core, dual processor, SLI system will be a piece of cake, and at a noise level that won't make your ears bleed," says Tye. We're not surprised by his confidence in the cooling system: Of the three rigs in this article, all of which sport the ASUS A8N-SLI Deluxe and 2.6GHz FX-55, the F:5 has the highest overclock at 2.75GHz.

The F:5's liquid-cooling system includes a Swiftech anodized aluminum radiator, which stands vertically against the front of the system. The reservoir looks nothing like the box that sat in the Rage F:1; the new reservoir is a slim package that resembles a freezer pack. Unlike Maingear, which puts its reservoir on display, Voodoo tucks it out of the way, above the optical drive. The cooling system also boasts several copper waterblocks, including an extremely small block that just barely fits between the two enormous NVIDIA GeForce 6800 Ultra SLI cards. We noticed that Voodoo also attached waterblocks to each of the video cards, cooling and quieting at the same time. Thanks to the liquid-cooling system and quiet case fans, the F:5 is stealthy.

Voodoo paid special attention to the system's airflow when it designed this rig. The radiator's two large fans pull air through the front of the system, thanks to the front panel's Swiss cheese design. Air flows through the divider's Voodoo

We're a little shocked the extras package doesn't include a temporary Voodoo logo tattoo, but we'll take the T-shirt. If you don't like the mousepad, wait awhile. Voodoo will soon offer a new pad—we won't give you any hints about the design.

logo into the upper portion of the chassis. It also shoots under the divider into the hard drives. The PSU, on the other hand, circulates air via holes in the floor and back of the chassis. Rahul Sood, Voodoo's president and CTO, points out that in standard ATX cases, the power supply's fans help cool the processor and other components in that hot case area. "Because the power supply is running hotter, it's not as efficient as it normally could be," Sood says. "In this case, the power supply is just cooling itself and therefore it's a lot more efficient in this situation than it is in a standard ATX situation."

Voodoo stocked the hard drive cage with two 160G Seagate Barracuda drives (striped array) and popped a Pioneer DVR-108, which boasts 4X Dual Layer DVD+R, into one of the three external 5.25-inch bays. Voodoo didn't paint its keyboard and mouse, but we're not complaining; the builder chose the Bluetooth-enabled Logitech DiNovo desktop. ▲

The F:5's unusual layout flips the motherboard. The PCI slots now stand at the top of the system and the PSU sits at the bottom.

Voodoo PC Rage F:5 Specifications

CPU	2.6GHz AMD Athlon 64 FX-55 at 2.75GHz
Motherboard	ASUS A8N-SLI Deluxe
Chipset	NVIDIA nForce 4 SLI
RAM	2GB Crucial Ballistix PC3200 DDR (1GB x2)
Hard Drive	160GB Seagate Barracuda ST3160827AS SATA 7,200rpm (x2; RAID 0)
Graphics	256MB NVIDIA GeForce 6800 Ultra PCI-E (x2)
Sound	Creative Labs Sound Blaster Audigy 2 ZS
NIC	Integrated Gigabit LAN (x2)
Optical Drive	Pioneer DVR-108 16X/4X/16X DVD±RW, 4X DL DVD+R, 40X/32X/40X
Optical Drive	N/A
Media Reader	Voodoo Media Reader
PSU	600W Enermax Noisetaker 2.0 EG701AX-VE(W) 24-Pin
Cooling	Voodoo F:5 Supercharged Intercooler, Arctic Silver 5
Chassis	Voodoo MAGA Aluminum (BAM Finish)
Keyboard	Logitech diNovo Media Desktop
Mouse	Included w/Keyboard
OS	WinXP Pro
Extras	Voodoo Attack-Pad Mousing Surface, Voodoo T-Shirt
Documentation	Certificate Of Ownership, Benchmark Scores, Faux-Leather Binder, Tech Specs, VDRS Instructions
Warranty/Support	Standard Select Upgrade Assurance, Toll-Free Tech Support, VDRS (Voodoo Disaster Recovery System), Voodoo Game Doctor (1 year license), Voodoo Platinum Care (3 year)
Price	$6,057.70

Benchmarks

SYSmark 2004 (Overall Score)	192
SYSmark 2004 Internet Content Creation (Overall Score)	227
SYSmark 2004 Office Productivity (Overall Score)	163
3DMark03 Build 3.6.0	21247
3DMark05 Build 1.2.0	9656

Doom 3 (Ultra Quality 4XAA 8XAF)

800 x 600	60.5
1,024 x 768	59.9
1,280 x 1,024	60
1,600 x 1,200	56.6

Far Cry Patch 1.31 (Very High 4XAA 8XAF)

800 x 600	99.37
1,024 x 768	100.73
1,280 x 1,024	88.13
1,600 x 1,200	70.26

Half-Life 2 (High 4XAA 8XAF)

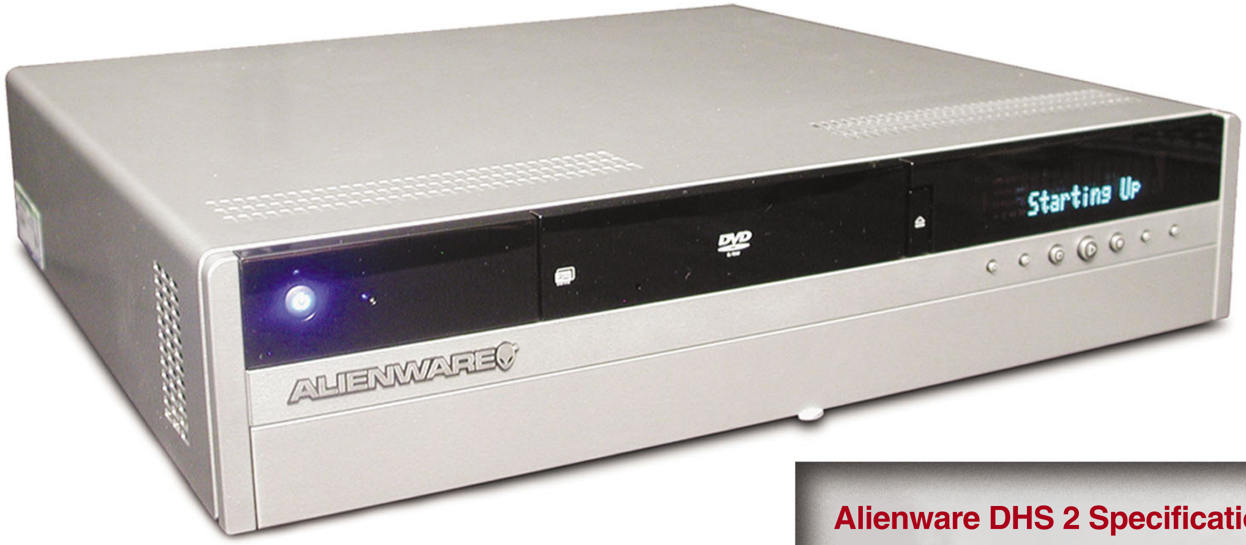
800 x 600	90.39
1,024 x 768	89.18
1,280 x 1,024	85
1,600 x 1,200	75.48

ALIENWARE DHS 2

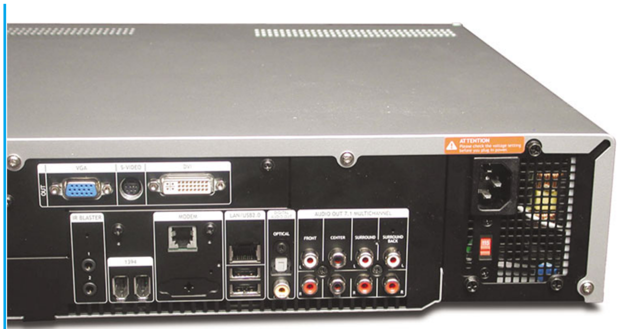
TAKING IT TO THE LIVING ROOM

Thanks to the LCD, the system almost resembles a VCR.

If you think the joystick is overkill, wait until you lose the remote, keyboard, and mouse in the couch.



Why fight your VCR's cryptic controls when you can command your new entertainment center via the familiar Windows OS? Alienware's DHS 2 isn't the first media center on the block, but it has an extremely low profile and it produces very little noise. And it's cooler than your VCR by a long shot. ▲



The DHS sports plenty of audio and video ports in front and back.

Alienware DHS 2 Specifications

CPU	3.4GHz Intel P4 550
RAM	1GB Alienware PC2 3200 (512MB x2)
Hard Drive	250GB Western Digital Caviar SE 7,200rpm SATA
Graphics	12MB ATI Radeon X300 PCIe, Avermedia NTSC TV Tuner (x2)
Keyboard	Gyration Ultra GT Compact Keyboard Suite
Mouse	Included w/Keyboard
OS	WinXP MCE 2005
Price	$2,038

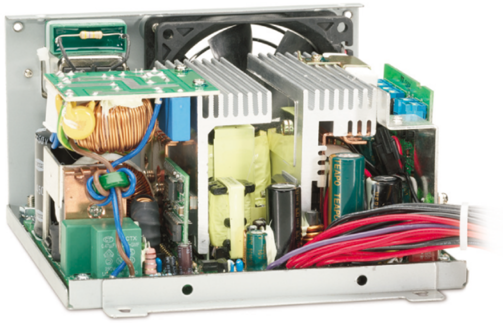
Benchmarks

PCmark 2004 Build 1.3.0	4862
CPU Score	5148
Memory Score	5094
Graphics Score	1673
HDD Score	4795
3DMark03 Build 3.6.0	**2642**
3DMark05 Build 1.2.0	**981**

The SLI Supply!

New Dual PCI Express Connectors

Turbo-Cool® 510 is the *Only* PSU Guaranteed to Power SLI Systems.



More Guts Than Any Other PSU.

MAXIMUMPC
KICK ASS
PRODUCT

Maximum Performance—No Gimmicks

- 510W @ 50°C (Commercial/Industrial Rated)
- The Only Power Supply Certified by NVIDIA
- The Beefiest Caps, Inductors, Heat Sinks, etc.
- The Best Sag and Surge Protection (.99 PFC)
- The Highest +12VDC Output (34A, 38A Peak)
- The Tightest Voltage Regulation (+VDC @ 1%)
- The Cleanest Power (+VDC Ripple @ 0.5%)
- The Industry's Strongest Warranty (5 Years)

PC POWER & COOLING, INC.

High-Performance Computer Power Supplies Since 1985

www.pcpowercooling.com • 5995 Avenida Encinas, Carlsbad, CA 92008 • (760) 931-5700 • (800) 722-6555

Reviews, comparison chart, specifications, and pricing available on website. Turbo-Cool and PC Power and Cooling are registered trademarks of PC Power & Cooling, Inc. ©2005

68 Eurocom D700T Enigma

69 Sharp Actius AL3DU

70 Toshiba Qosmio G15

There's no reason why a dream can't be mobile. By now, you know that mobile graphics chips are a half-step away from drawing even with their desktop counterparts. You can plant desktop CPUs in notebooks, and in some situations, the more clock-efficient Pentium M can even outstrip its beefier brethren. You may not get as much hard drive storage, but the spin rates and interface are potentially desktop class.

The fact is that you can often get 80% or better the performance of a desktop in a package you can tuck under your arm and sprint for the bus with. Of course, the loftier the laptop, the more you might also be inclined to bench press it, but that's the price for performance. We gathered three of the latest pack-leading notebooks, put them under the knife, and ran them until they begged for mercy. Here's the stuff mobile computing dreams are made of.

by William Van Winkle
Graphics & Design by
Andria Schultz
& Fred Schneider

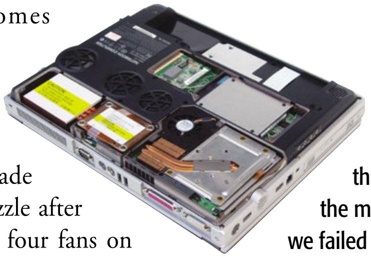
kings of the road

our magnificent mobile dream PCs

EUROCOM D700T Enigma

D700T Enigma
$3,199
EUROCOM
www.eurocom.com

The EUROCOM D700T is enough to elicit a puddle of drool from any LAN partier. Weighing in like a tank (about 10.2 pounds), but powerful as one, too, the D700T blew our competing Centrino units away on performance. The machine comes with ATI's latest Mobility Radeon X800 GPU, 1GB of DDR, and a 3.4GHz Pentium 4 550 desktop CPU. We were literally made aware that this beast will sizzle after prolonged stress. There are four fans on the bottom, in addition to CPU and GPU heatsinks in the rear with twin circular intake vents on the sides. Mind your fingers around the CPU heatsink grille.



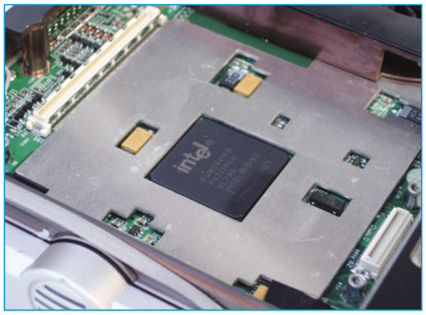
Remove the D700T's bottom panels and this is what you'll see. Note that the one absentee is the memory modules, which we failed to access.

The D700T's looks are pleasant (14.2 x 11.5 x 1.5 inches), styled in black, silver, and charcoal. We grew to like the odd circular touchpad and integrated scroll wheel, and EUROCOM builds in a BIOS-based CD and FM player that operates without an OS boot. Buttons below the wrist rest let you control playback with the screen closed. Two up-firing speakers flank the buttons, with two down-firing speakers under these. This quadrophonic approach still needs a subwoofer, though, as the effect is still weak for good music.

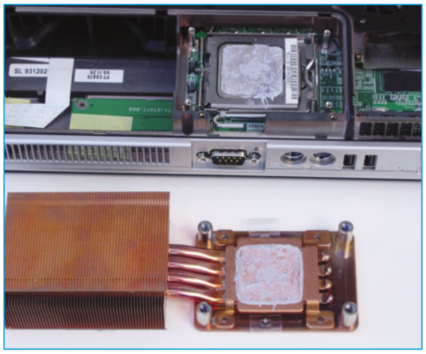
There's no need to dwell on benchmarks; the D700T screams—perhaps too much. Before we could finish testing, we closed the system for a moment, opened it back up, and where a Windows Desktop had been there was a black background with two vertical lines. Safe Mode came up fine, but Normal Mode only showed the lines henceforward. EUROCOM had no updated drivers as of this writing. ATI noted it had seen the problem once before with a loose lead from the screen to GPU, but reinserting the GPU module firmly had no effect. (We did notice one nut securing the module to the motherboard had snapped off, although the screw was holding it in place.)

About the only power feature missing look to be a RAID setup. There's room for two drives (one internal SATA or IDE and one via a modular bay but IDE only). There isn't a way, however, to easily access the RAM. There's no bottom hatch, and we couldn't devise a safe way to get under the keyboard without any instructions. EUROCOM's official line is that factory-authorized techs should handle all upgrades. You may never need to upgrade from 1GB to 2GB, but EUROCOM makes the prospect daunting.

Still, there are tons of extras. The integrated Web cam delivered surprisingly good video, and there's an onboard



Two data connectors flank the chipset's protective metal plate. Into these connectors plug the ATI MRX800 GPU and the plate-mounted GPU heatsink.



Got goop? The EUROCOM D700T's 775-pin CPU socket will be old hat to many power users, even if the heatsink apparatus seems foreign.

AVerTV tuner linked to an external mini connector. The adapter option didn't ship with our unit, however. There's also a 1/8-inch connector for SPDIF output, SD/Memory Stick slot, and floppy drive. Figuring that our glitchy unit was probably a fluke, we're confident this notebook has the goods for high-end performance. ▲

Note the easy access to EUROCOM's BIOS-based media player controls and the four audio output jacks under the DVD burner. Also note the small LCD screen that shows EUROCOM's logo, over and over and over.

sharp actius AL3DU

Actius AL3DU
$3,499
Sharp
www.sharp3d.com
CPU CPU CPU CPU

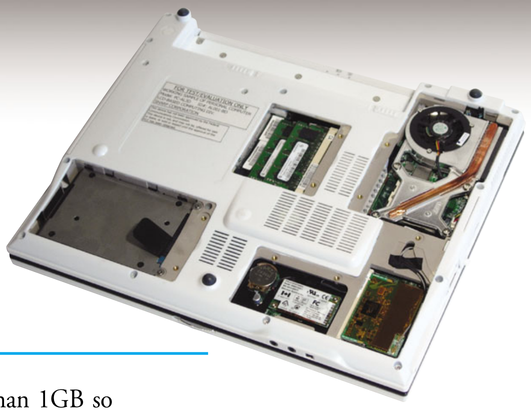
Sharp's second-generation 3D-enabled notebook is a stunner. You've probably witnessed 3D before with glasses—Disney's Captain EO, a creature feature (besides Captain EO), or the like. Sharp's groundbreaking display technology, which we first covered in "Under Development" not even three years ago, is not only here but within reach for high-end buyers. In a nutshell, designers figure there are a certain number of "views" in front of the screen, meaning eyeballs to receive visual data. Because a laptop is likely to be a single-user device, thus requiring two views, the horizontal resolution is divided in half when displaying 3D, with odd lines targeting one eye and even lines targeting the other. This creates the stereoscopic effect of 3D, but it also requires your eyes to be roughly an arm's length away, perpendicular to the center of the screen's plane for the best effect.

Sharp's 3D viewing only works with compatible software. Because NVIDIA has labored to build 3D into its drivers, pretty much any OpenGL or DirectX game can become 3D. (Flaming, flying 3D heads in Doom 3 buzzing you is sweet!) But that's after you get used to the effect. We had to keep the separation turned to its minimum to prevent ghosting and to thwart nausea and headaches. (According to Sharp, children don't have this problem, only adults whose visual wiring resists change. We used Sharp's bundled 3D DVD player to

Here you can see Sharp's adoption of the SATA interface, which makes hard drive upgrading even easier.

render "Thomas the Tank Engine" in 3D for a 3-year-old boy; he thought it was a riot.) After an hour or two, we were bothered far less.

The AL3DU (12.9 x 10.8 x 1.17 inches; 7.5 pounds) is a beautiful machine, adorned in glossy pearl with a slightly curved keyboard for better comfort and ergonomics. Sharp ignores the usual hotkey buttons above the keyboard and only plants buttons for power and 3D enable/disable. Integrated audio is OK, and a faster drive might have been better than the included 5,400rpm Fujitsu 80GB drive because this notebook type sells well into CAD and other high-visualization apps, but these are niggles. Our only real component complaint is the use of two 512MB DDR2 sticks rather than 1GB so you're left with an open expansion slot.


Here is the AL3DU with its innards exposed. Few vendors condone user upgrading, but Sharp has done an excellent job of making the replaceable components accessible.

Thanks to a 533MHz FSB Pentium M and NVIDIA GeForce Go 6600, Sharp pulled in some very respectable benchmark scores, proving this a more than capable gaming machine. The AL3DU features only a 15-inch XGA screen, though, and the 3D technology makes the 2D viewing angles atrociously bad, almost like the early passive-matrix days. Sharp's objective going forward is to increase screen resolution and views, which should help. Also note that the screen prohibited Sharp from building in an antenna, so there's no integrated wireless.

Sharp's keyboard is slightly curved for increased comfort. We like that Sharp stealthed the VGA-out and LAN connection between the vent and USB ports.

This is obviously an early adopter's device, but nothing compares on "wow factor." The AL3DU was stable, sleek, and mind-blowing. Even if you can't afford it, try to at least see it up close.

Toshiba Qosmio G15

Qosmio G15
$2,999
Toshiba
www.toshibadirect.com

There's no denying that Media Center Edition 2005 is a killer multimedia and DVR platform, long on functionality and short on anything that might confuse users. Some people want to take all of MCE's benefits on the road, whether it's to keep recording in a friend's house or a hotel room or to grab multimedia content for playback anywhere. Crafting a smart MCE notebook isn't easy, but the Toshiba Qosmio G15 (16 x 11.2 x 1.71; 9.7 pounds) does a strikingly solid job.

For starters, it integrates a BIOS-based media player for running CD

The G15 comes with 60GB primary and 40GB secondary hard drives. A mirrored RAID might be better for some owners, but the present configuration will make trading out the 40GB for a larger drive down the road more palatable.

audio, DVD movies, and TV (channels 1 through 13) without loading an OS. Player controls run just over the keyboard, set into a sleek, silver grille. You can spy the twin harman/kardon speakers through the grill on the left and right. Toshiba builds in some audio enhancement from SRS (the most useful is TruBass), but the integrated audio falls short of other enthusiast models we've seen with down-firing subwoofers.

Toshiba's 17-inch glossy TruBrite widescreen, which boasts 500:1 contrast and 335Cd/m^2 brightness when plugged in (208Cd/m^2 on battery), is outright stunning, and the 130-degree horizontal viewing angle means plenty of viewers can crowd around for show watching. The integrated SD/xD/Memory Stick reader, Bluetooth, and 802.11b/g are good pluses. We really like the wireless on/off switch rather than futzing with hotkeys or the Zero Config tool.

The Qosmio's MCE performance was quite good considering the mobile form factor. We saw some very heavy pixelation the first time we went into Live TV, but activating the recording feature seemed to clear this up permanently. Toshiba's tuner introduces a slight amount of background noise, but colors and clarity remain satisfactory. Only rarely did we notice a quick skip.

Interestingly, the G15 demonstrates that fast graphics aren't mandatory for a decent MCE experience. The poor numbers our 3DMark and gaming tests returned surprised us. Some of the difference between the Sharp Actius and Qosmio may be due to Toshiba making do with a prior-generation 400MHz FSB Pentium M (model 745) rather than Sharp's current 533MHz model 750. More likely, Toshiba's use of the NVIDIA GeForce FX Go5700 GPU is to blame.

Toshiba gets high marks for its keyboard, which had an unusually comfortable feel. We don't mind Toshiba opting for 5,400rpm hard drives, which are fine for MCE work, but we wonder if a RAID 0 configuration with matched drives instead of the current 60GB/40GB split might make more sense for a device prone to getting knocked around. Still, if gaming performance isn't a priority, the G15 is a sexy, comfortable, and flexible machine. ▲

The G15's media buttons are attractive, but they could have been more useful if positioned outside the closed screen's reach.

Benchmarking The Leaders Of The Mobile Pack

If you're going to spend a king's ransom on a mobile rig, it had better be able to do more than look good. We ran our mobile review systems through a slew of tests. Here's how they performed.

Vendor	Model	CPU	3DMark05 v1.1.0 1,024 x 768 x 32	Doom 3 demo1 @ 1,024 x 768 ultra	Half-Life 2 1,024 x 768, custom demo file	Panorama Factory sample images, all correction enabled	PCMark04 v1.2.0					Dr. DivX 845MB VOB; 1,000Kbps, 1-pass	WinRAR 500MB folder
							System	CPU	Memory	Graphics	HDD		
EUROCOM	D700T Enigma	3.4GHz Pentium 4	3821	68.5	63.58	0:21	63.58	63.58	63.58	63.58	63.58	63.58	63.58
Sharp	Actius AL3DU	1.86GHz Pentium M	2081	57.7	54.92	0:25	54.92	54.92	54.92	54.92	54.92	54.92	54.92
Toshiba	Qosmio G15	1.8GHz Pentium M	524	16.4	45.29	0:26	45.29	45.29	45.29	45.29	45.29	45.29	45.29

three other must-touch mobiles

Of course, three notebooks don't really do justice to a top-tier notebook discussion. That's why we found another three to keep you talking.

Acer TravelMate 8100

Looking for extreme value over extreme speed? The TravelMate 8100 delivers the best of all worlds, including fast graphics based on ATI's 128MB Mobility Radeon X700, a 533MHz Pentium M, tri-mode (a/b/g) integrated wireless, Bluetooth, a 5-in-1 card reader, GbE, and a 15.4-inch WSXGA+ widescreen display. Tack on such items as a PCI-E-based expansion dock and a mere 6.3-pound weight and it's hard to think of another notebook that delivers so much in a 1.2-inch-high form factor.

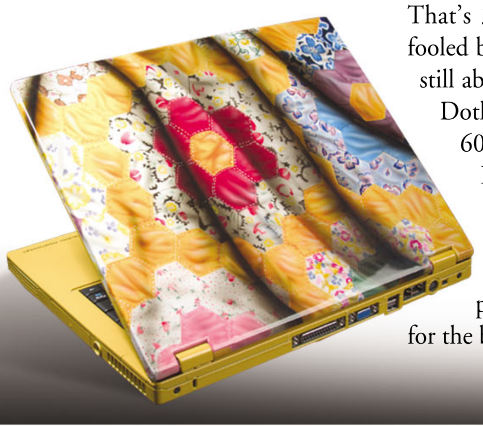
TravelMate 8100
$2,199
Acer
global.acer.com

Dell Inspiron XPS Gen 2

The Dell XPS is famed in gaming circles as one of the fastest, baddest portables in the world. The only problem was that the looks were bland. The new Gen 2 is taking XPS to a whole new level. Full details were unavailable as of press time, but Dell notes that the rig will weigh 8.61 pounds and boast a 17-inch widescreen backed by a Pentium M and the exclusive offering of NVIDIA's 256MB GeForce Go 6800 Ultra. There will be LED perimeter lights in 16 colors (customizable via Dell's power management app), snap-on personalization covers, a BIOS-based media player, and Windows MCE 2005. Nice!

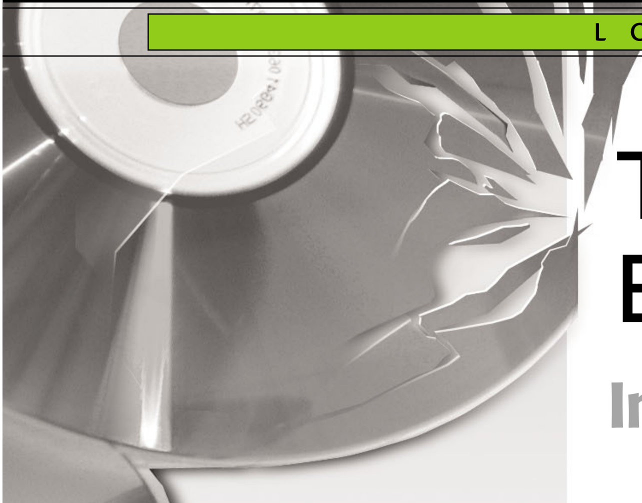
Inspiron XPS Gen 2
$2,749 and up
Dell
www.dell.com

Falcon Northwest FragBook TL



That's 32 hours of hand airbrushing, folks. But don't be fooled by the quilt design. Under the hood, the FragBook is still about power. Our configuration specs include a 2GHz Dothan (Pentium M 755), 1GB of 333MHz memory, a 60GB 7,200rpm Hitachi Travelstar drive, 2X DVD-RW, Intel 802.11b/g wireless, and ATI's 128MB Mobility Radeon 9700. Falcon even throws in a 256MB Corsair thumb drive. The custom paint job runs about an extra $600 or so, knocking the price well over $4,000. But the FragBook TL rules for the best mix of muscle and style around.

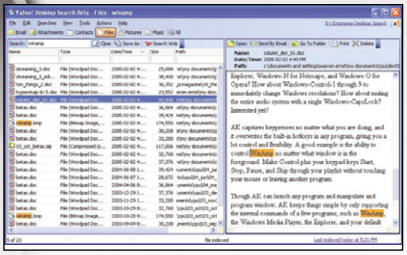
FragBook TL
$3,473.75
Falcon Northwest
www.falcon-nw.com



by Warren Ernst

The Bleeding Edge Of Software

Inside The World Of Betas



Yahoo! Desktop Search Beta - Files - winamp
Try Enterprise Desktop Search
Open
Send By Email
Go To Folder
Print
Delete
File indexed
Last indexed today at 5:21 PM

Name: column_dec_01.doc
Date/Time: 2005-02-02 4:49 PM
Path: c:\documents and settings\warren ernst\my documents\cpu\dec

Explorer, Windows-N for Netscape, and Windows-O for Opera? How about Windows-Control-1 through 9 to immediately change Windows resolutions? How about muting the entire audio system with a single Windows-CapsLock? Interested yet?

AK captures keypresses no matter what you are doing, and it overwrites the built-in hotkeys in any program, giving you a lot control and flexibility. A good example is the ability to control WinAmp no matter what window is in the foreground. Make Control plus your keypad keys Start, Stop, Pause, and Skip through your playlist without touching your mouse or leaving another program.

Though AK can launch any program and manipulate and program window, AK keeps things simple by only supporting the internal commands of a few programs, such as WinAmp, the Windows Media Player, the Explorer, and your default

Official product name: Yahoo! Desktop Search
Version # previewed: 1.0 Beta
Publisher: Yahoo!
Developer and URL: Yahoo!; desktop.yahoo.com
ETA: Q2 2005
Why you should care: Yet another Desktop search program, but perhaps with the exact features you need.

Yahoo! Desktop Search 1.0 Beta

Yahoo! Desktop Search leaps into an already crowded field filled with the likes of Google, Microsoft, Copernic, Blinkx, and X1. Yahoo! has teamed with X1 to offer its free tool. (X1's tool isn't free.) So, is Yahoo!'s tool just a stripped-down version of X1? Basically, yes. This isn't bad, though, as X1 is so feature-filled, some nip and tuck is beneficial overall.

Y!DS indexes the contents of your files and emails so you can more easily locate data on your computer that you may not be able to locate just by file name or by sorting through folders. Basically, you type in keywords for your search, and Y!DS returns matching email messages, Microsoft Office files, PDFs, and more. A preview window shows you exactly what the contents of your files include.

Y!DS differentiates itself from the competition in some ways. For example, it works within its own window instead of a Web browser, yet it adds a search toolbar to Outlook 2000 and later. You can print, email, and delete files it finds directly from the Y!DS window and search either by category or by all categories at once.

The program doesn't search through files belonging to other users on your Windows XP system or through your browser history or bookmarks because of privacy concerns. If you're the only user on the PC, however, you might miss this handy capability.

The beta is a little slow indexing files compared to other programs I've used, and the on-screen layout seems cluttered. Getting in on the beta, however, will give you the chance to provide feedback. ▲

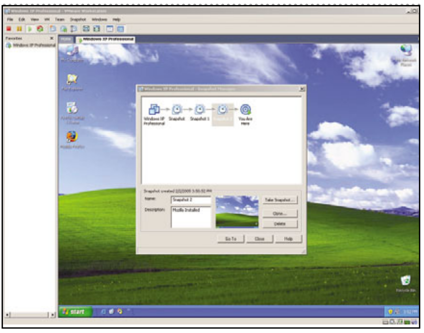
VMware Workstation 5.0 Build 12206 Beta

VMware has long been the standard in simulating multiple computers within a separate window in Microsoft Windows or Linux, and the latest beta adds new features that IT pros, developers, and those who deal with lots of virtual machines simultaneously desire.

Almost magically, VMware simulates separate computers on your Desktop. Virtual machines emulate standard PC hardware (down to the BIOS screen) and let you install and run different OSes within Windows XP or Linux. The machines can have full network access and use the base system's hardware peripherals. You can even drag and drop files from the host system to windows in the virtual systems. Performance was quite good in my testing.

Version 5's new features are all good and some are amazing. Among the good is a snapshot feature that lets you save multiple versions of a virtual machine, such as a fresh WinXP install, one with SP2 installed and one with Firefox installed. Previous versions supported just one snapshot. Multiple users can also now work from the same virtual machine drive image.

Performance while running multiple virtual machines on the same system is vastly improved. Virtual machines can now create their own subnetworks, and you can save AVI files of virtual machine activity to document procedures or errors and play them on machines without VMware installed. ▲



Official product name: VMware Workstation 5
Version # previewed: 5.0 Build 12206 Beta
Publisher: VMware
Developer and URL: VMware; www.vmware.com
ETA: Q2 2005
Why you should care: The easiest way to use multiple computers at once is to just use one.

Send Us Your Betas: Know of software in the beta stage that's deserving of some attention? Send your prospects to bleedingedge@cpumag.com. For more betas, subscribers can go to www.cpumag.com/cpuapr05/betas.

UP TO SPEED

Upgrades That'll Keep You Humming Along

Futuremark's video benchmarks get refreshed this month, as do components in ATI and NVIDIA's lines. Eudora is also much improved, and OpenOffice.org continues to move toward version 2.

Upgrades

3DMark03 Build 3.6.0

Futuremark's video benchmark now supports the latest CPUs and video cards and requires DirectX 9.0c. The library for detecting GPU clock frequency and memory has also been updated.

Get it at: www.futuremark.com

3DMark05 Build 1.2.0

This iteration of the benchmark supports the latest CPUs and GPUs and improves support for 128MB cards using antialiasing. Image-quality tools are also improved, and anisotropic texture-filtering settings have been modified.

Get it at: www.futuremark.com

BitTornado 0.3.10

This BitTorrent client gets fixes for various known bugs and adds a randomized port selection feature.

Get it at: www.bittornado.com

Eudora 6.2.1

Eudora now has a new ScamWatch feature to check for phish-related links and OpenSSL for improved security. There is also a Web search feature, better IMAP support for remote access to email, and improved spam filtering with the paid version.

Get it at: www.eudora.com

Intel Chipset Identification Utility 2.91

The tool that IDs your motherboard chipset, I\O controller, and memory controller has been refreshed to support the latest chipsets.

Get it at: www.intel.com

Kerio Personal Firewall 4.2 beta

The version adds HIPS (Host Intrusion Prevention System) security and a pane to display intrusion alerts. The configuration tool has been simplified, some features have been renamed for consistency, and some bugs and problems with the app's responsiveness have been fixed.

Get it at: www.kerio.com

Maya 6.5

The professional 3D graphics tool gets performance improvements, better CAD data importing, new scene segmentation tools, and more in this significant update.

Get it at: www.alias.com

McAfee AVERT Stinger 2.4.9.2

This standalone virus detection and removal tool cleans systems of known invaders, but it doesn't provide the ongoing, real-time protection of a full virus suite. This version removes major viruses identified before Dec. 14.

Get it at: vil.nai.com/vil/stinger

Microsoft Scriptomatic 2.0

The new version of this tool writes WMI scripts in VBScript, Perl, Python, and JScript. It also has new output options to save data as text, a Web page, or XML.

Get it at: www.microsoft.com

OpenOffice.org For Linux/ Windows 2.0 Snapshot Build

The Linux and Windows versions of the open-source office suite get bug fixes, modifications to the bibliography database, and toolbar and menu changes.

Get it at: www.openoffice.org

Skype 1.1.0.79

Recent versions have improved communication security and interoperability with Windows XP's firewall. New features include text chat, revised toolbars, improved language support, and new icons.

Get it at: www.skype.com

Winamp 5.08d

Winamp plugs a few security holes and fixes problems with some skins.

Get it at: www.winamp.com

Driver Bay

ATI Catalyst 5.1

The latest suite of drivers for the Radeon family includes the Catalyst Control Center, which lets you enable/disable 3D preview. The display driver resolves issues with several recent games, and secondary and TV displays.

Get it at: www.ati.com

Intel PRO Adapter Driver Set 9.2

The driver suite for Intel's Ethernet network adapter chipset embedded on many boards has been reorganized. The PROSet Device Manager for tweaking and monitoring settings is now in the Windows Device Manager rather than the System Tray. Driver versions are available for most Windows flavors, including the WinXP 64-bit edition and from Windows 95 on.

Get it at: www.intel.com

NVIDIA nTune 2.0.23

For nForce2/3/4-based boards, this tweaker accesses and adjusts system components, including voltages and clock speeds. You can overclock your system from within Windows and without entering the BIOS. This complete update replaces previous versions but requires vendor specific setup files for accessing advanced features.

Get it at: www.nvidia.com

NVIDIA WDM Driver 2.20

For NVIDIA GeForce cards with video-in and video-out support and\or TV tuners, these drivers boost performance when the cards are used with nForce3 boards.

Get it at: www.nvidia.com

by Steve Smith

Cross
over
to the
other
side.

Xd.
The DEQX
Calibrated™
DSP
corrected
powered
speaker
system is
everything
you've never
heard
before.

NHT

www.nhthifi.com

©2004 Rockford Corp.

Calling Home

A Roundup Of Remote-Access Programs

Most of us use multiple computers, such as one at work and one at home. The problem can be making sure each has all the files you need when you need them. Nothing is worse than being on a business trip only to discover you've left that PowerPoint presentation back on your desktop.

That's where remote-access programs can rescue you. Simply put, these apps let a client computer (the one you're physically using) tap into a host system (the remote computer), through a telephone line or via a wired or wireless Internet connection, and retrieve files you need. Some apps can completely control a remote computer as if you were physically typing on its keyboard. Some can also control an unattended computer and help with training and consulting. For example, a technician on a client system can tap into a host computer and remotely configure it while showing a customer exactly what's happening. Most remote-access apps also include text and voice chat so users can communicate.

We first looked at remote-access programs in our August 2003 issue (page 68). This review catches up on developments and looks at newer programs not covered then.

To test, I used a Sony VAIO notebook with a 900MHz AMD Duron to remotely connect to an AMD Athlon +1700 desktop computer over a broadband connection. I focused primarily on how easy it was to set up the host computer, transfer files between computers, and control the host while typing in Microsoft Word, browsing in Firefox, retrieving email in Outlook Express, writing and compiling a simple program in Visual Basic, and running drive diagnostic tests with System Mechanic.

Citrix Online GoToMyPC

Unlike other apps that require a host and client program installed on each computer, GoToMyPC connects systems via its Web site, which has three major advantages.

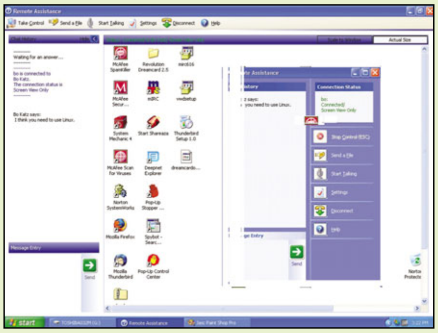
First, it lets users access a host computer from any system that can run a Java-based Web browser, including Internet kiosks; PocketPC or Windows CE handhelds; and Macintosh, Solaris, and Linux computers. Second, it simplifies connecting to a host because you don't have to mess with IP addresses or configure routers or firewalls. Instead, you leave the host computer connected to an always-on connection (required) and download a 1.4MB program from GoToMyPC that lets you remotely control the host. Third, Citrix Online constantly updates, patches, and improves GoToMyPC, so you're always using the latest version as long as you keep using (and paying for) a GoToMyPC account.

Once connected, you can remotely print files, restart the host, chat, and transfer files. Screen refresh times and mouse movements were noticeably slower than with a regular computer, even through a broadband connection, but not unbearably so. Some screen areas displayed slight variations in color, but this didn't detract from using GoToMyPC.

The app doubles as a training tool to help users remotely. To highlight part of the screen, a drawing mode lets you use your mouse pointer to draw lines and other marks as points of emphasis. GoToMyPC also uses SSL encryption to protect your username and password when connected to its Web site. To make sure only authorized users access your host computer, you can configure a One-Time only password, which lets a user only access the system once. Once you're connected to a host computer, GoToMyPC uses AES 128-bit encryption to protect the data flow.

Windows XP Remote Assistance

Windows XP Remote Assistance can only connect two WinXP computers at once. Unlike commercial apps, WinXP Remote Assistance can't remotely access an unattended computer. Instead, someone at the host computer must create and send a request file to another user via email or Windows Messenger. Once the other user receives the file, he can view the host computer's screen, type text messages, and send files.

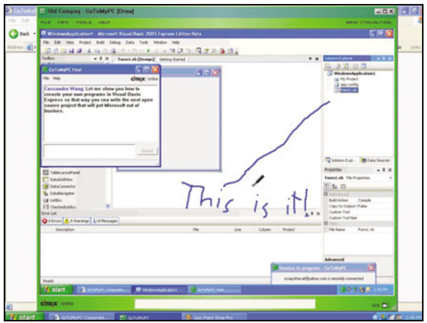


To prevent unauthorized users from controlling a host computer, WinXP lets you optionally define a password and set a time limit for how long the host computer is available. WinXP also won't let anyone control your computer without explicit permission. If either computer is running a firewall, the program may not work. Turning off a firewall isn't difficult, but some novices may be hesitant to do so. Unfortunately, novices are often the main target audience for using Remote Assistance.

In my testing, after moving a window on the host computer, the same image appeared on the remote. The screen refresh was slow even over a broadband connection, which meant the image showed up multiple times on the remote co mputer. Thus, I could see the window's original position, final position, and every position in between. After nearly a minute, most of the additional images disappeared, although some portions remained.

Remote Assistance is available in WinXP Home Edition, but if you want to remotely control an unattended computer, you'll need Remote Desktop, which is only available in Windows XP Pro. Remote Assistance is better than nothing, but it's limited and cumbersome to use. You'd be better off using another program. ▲

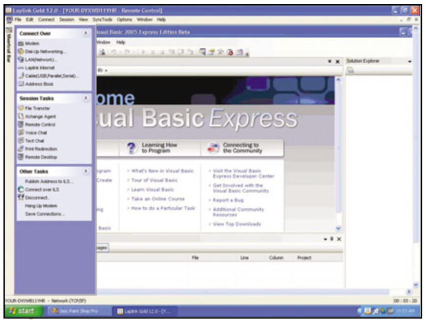
CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect



GoToMyPC

$19.95 (month), $179.40 (annual)
Citrix Online
www.gotomypc.com

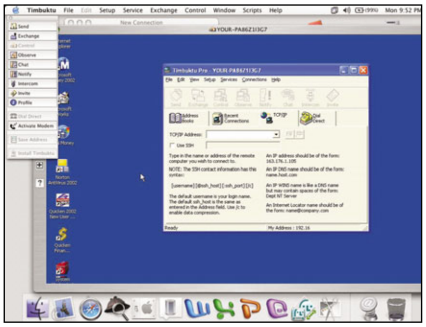
CPU CPU CPU CPU



LapLink Gold 12

$129.95 ($109.95 download)
LapLink
www.laplink.com

CPU CPU CPU C



Timbuktu Pro 8.0

$169.95
Netopia
www.netopia.com

CPU CPU CPU C

The program requires a monthly or annual subscription, making it potentially more expensive in the long run than other apps. It's quick and efficient, though, and a free trial is available. Corporate users may be especially interested because of the simplified setup and ability to manage multiple PCs with corporate accounts.

LapLink Gold 12

LapLink Gold 12 can connect to a host via dial-up, a LAN, and an included cable (boxed version) that connects two computers through USB ports. To connect via the Internet without configuring a firewall or router, LapLink offers an Internet option that lets you connect to a host over the Internet after creating an account on LapLink's site. Your account displays the name of your host computer, which you can access by clicking its name.

Most remote-access apps let you transfer files, but LapLink includes a built-in virus scanner with free updates for a year. Most users use an antivirus program, but the scanner is good insurance for those who don't. To make file transfers easier, LapLink has a synchronization feature that lets you maintain identical files on two computers. When you connect to a host computer, LapLink can automatically synchronize files between the two computers so you don't have to.

When I accessed a remote system through a broadband connection and the included USB cable, screen refreshes and keystroke response times were barely noticeable. LapLink transferred files quickly with options to copy and synchronize entire folders on each computer and to overwrite old files with the latest versions. (Make sure your systems' clocks are synchronized; if one is off, the app may overwrite a current file version with an incorrectly dated older version.) LapLink's security relies on usernames and passwords and an older version of LapLink's proprietary encryption and Microsoft's encryption via its Crypto API.

LapLink strictly focuses on connecting Windows computers, but a LapLink Internet account is free for a year. An additional annual subscription is $19.95 per year with antivirus updates or $14.95 per year without antivirus updates.

Netopia Timbuktu Pro 8.0

Netopia offers Timbuktu in Windows and Mac versions. The program can also function as a chat service. (I tested the final code included in the 8.0 version, which I downloaded from Netopia.)

You can configure the app to automatically notify you when other Timbuktu users are online. Once notified, you can connect to chat, transfer files, or remotely control each other's computer, which is something an IM (understandably) won't let you do. Although Timbuktu allows for direct access through a telephone line, most users are likely to use the Internet to access a host computer. Because remembering the cryptic IP address of the host computer may be troublesome, Timbuktu offers a unique directory service dubbed Internet Locator Service (findme.netopia.com).

To use the service, you enter an email address you want to associate with the host computer that's stored in the Locator Service. When you turn on the host, Timbuktu connects to the Internet Locator Service and automatically matches the host computer's IP address with the email address. When users want to connect to the host, they go to the Internet Locator Service, find the email address, and connect to the host without typing a cryptic IP address.

Even with a broadband connection, screen refreshes were a bit jerky, and moving a window caused a short delay before the screen responded on my Sony notebook. Typing was more noticeably delayed from when I pressed a key to when the host responded. Access to the host system wasn't impaired otherwise.

Timbuktu uses passwords and service restrictions for security. You can configure passwords to expire after a certain time or to lock out users who type an incorrect password a fixed number of times. Even with correct passwords, you can restrict what users can do on the host computer. New in this version is SSH security when connecting host and client computers.

Combined with the ability to notify you when other Timbuktu users are available and the Internet service, Timbuktu can meet the needs of corporate and individual users, Windows and Mac.

Symantec pcAnywhere 11.5

pcAnywhere's impressive array of features include the ability to remotely control a

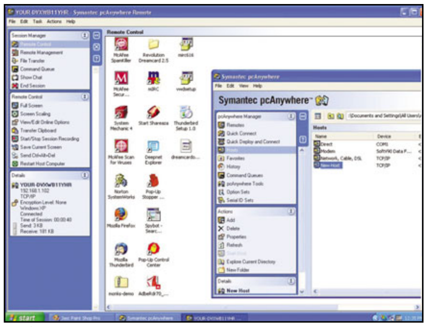
CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Windows or Linux computer from any Windows system, a Java-based browser, or PocketPC device. Most users are likely to use the app via an Internet connection, but you can connect via a phone, LAN, or serial-to-serial or parallel-to-parallel port connection (with optional cables).

You must install pcAnywhere on the host and remote computers and define a valid username and password on the host. You can restrict a host to only accept connections from certain IP addresses. If you're connecting via a phone, you can turn on the app's Call-back feature, which forces pcAnywhere to immediately hang up upon connection so it can call back at a predetermined phone number. This ensures that callers can only access a host computer from a trusted telephone number. For greater security between a host and client computer, there's 256-bit AES encryption, which is the strongest encryption available among these programs.

When connecting to a host, you type the host's telephone number or IP address. If the host is behind a firewall, you may need to configure it to allow a remote connection. If it's behind a router, you may need to configure it to determine the specific IP address you need. This isn't difficult for advanced users, but novices won't likely know how. Once you're connected, pcAnywhere lets you take complete control of the host, even restarting it or editing the Registry.

Performance was good over a broadband connection, with minimal delays between mouse movements and keystrokes. File transfers worked quickly, and for added convenience, pcAnywhere can schedule file transfers automatically.



pcAnywhere 11.5
$199.95
Symantec
www.symantec.com

CPU CPU CPU CPU

What About Free Programs?

If you don't want to pay for a remote-access program, there are free, open-source apps available. Visit SourceForge.net and search for TightVNC, Ultr@VNC, or the whimsically named Chicken of The VNC. Although free, open-source programs aren't always as easy to use as their commercial counterparts. Hobbyists, however, may find them useful, informative, and more expansive, especially if they want to dig into the source code. ▲

Corporate users might especially like pcAnywhere's ability to record, save, and play back all events while connected to a host. Such sessions are useful for showing others how to solve a particular problem. In addition, pcAnywhere can capture individual screenshots of the remote computer. With its cross-platform abilities and emphasis on security, pcAnywhere is perfect for corporate and business users. Its features may overwhelm some, but most users will be able to use it right away. ▲

by Wallace Wang

See our "The Dark Side Of Remote-Access Programs" sidebar at www.cpumag.com/cpuapr05/remote.

Which One Should You Dial Into?

All the remote-access programs here worked well, but not all are suitable for all users. The following is a list of each program's strengths to help determine which one is right for you. ▲

Program	Host computer OS requirements	Client computer OS requirements	Security features	Remote connection options	Unique feature	CPUs
Citrix Online GoToMyPC	Windows	Any computer with a Java-enabled browser, PocketPC devices	SSL-encrypted Web site, AES 128-bit encryption, username and passwords, One-Time password feature	Host computer requires an always-on connection	Drawing mode to highlight items on both screens	4
LapLink Gold 12	Windows	Windows	Username and passwords, modem callback, LapLink and Microsoft encryption	Telephone, Internet, LAN, USB cable	Included USB cable to transfer and synchronize data, antivirus scanner for file transfers (12 months free)	3.5
Netopia Timbuktu Pro 8.0	Windows, Mac OS X	Windows, Mac OS X	Username and passwords, SSH secure connections	Telephone, Internet, LAN	Notifies in real time when another Timbuktu user is available, remote access to Windows or Mac computers	3.5
Symantec pcAnywhere 11.5	Windows, Linux	Any computer with a Java-enabled browser, PocketPC devices	Username and passwords, modem callback, AES 256-bit encryption	Telephone, Internet, LAN	Remote access to Windows or Linux computers, can record and playback remote sessions	4

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

How easy should recording a DVD be?
THIS EASY.
The HUMAX DVD Recorder with TiVo® service.

The HUMAX DVD Recorder makes it easy to control television and create DVDs. That's because the same great TiVo® service that lets you find and store your favorite programs, guides you through the process of burning a DVD. And don't worry about shelf space. This little box takes the place of three components. It's an 80-hour TiVo Series2™ DVR, an advanced DVD player, and an easy-to-use DVD Recorder. So search for shows and save them on the hard drive or burn them right to a DVD. With the HUMAX DVD Recorder, your shows can go wherever you go, easy.

Contact HUMAX at 866-486-2987 or www.humaxusa.com

TiVo®

BEST BUY Now that's a great idea!

circuit city

amazon.com

good guys

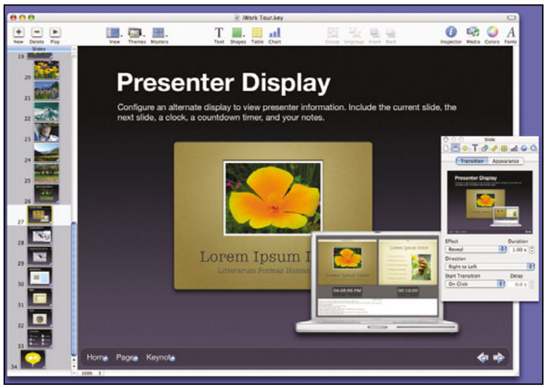
J&R MUSIC WORLD COMPUTER WORLD 800-221-8180

ELECTRONICS expo It's all about entertainment.

© 2004 HUMAX Company, Ltd. All rights reserved. "Easy Digital" is a registered trademark of HUMAX Company, Ltd. TiVo and the TiVo logo are registered trademarks of TiVo Inc. Series2 is a trademark of TiVo Inc. TiVo service is required and sold separately. No functionality is represented or should be expected without a paid subscription to the TiVo service. Pricing, terms and conditions subject to change. Receipt of TiVo service is subject to the terms of the TiVo service agreement. TiVo service is accessed through a standard telephone line and is available as a local call in most areas. In some areas, local and long-distance toll charges may apply. Actual recording capacity depends on signal quality and type of programming being recorded.

HUMAX
EASY DIGITAL™

Apple Computer iWork '05



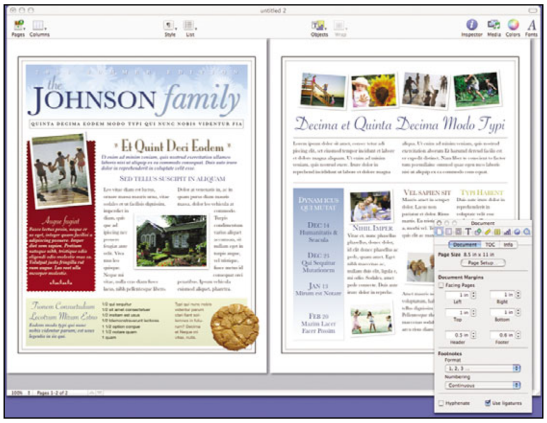
iWork Tour.key
Presenter Display
Configure an alternate display to view presenter information. Include the current slide, the next slide, a clock, a countdown timer, and your notes.
Lorem Ipsum
Home Pages Keynote

- **iWork '05**
- $79
- Apple Computer
- www.apple.com

iWork '05 is Apple's new productivity suite. It bundles an updated version of the presentation application Keynote and a new word processor called Pages.

Pages focuses on layout and design; if the writing project you're working on needs to be a nicely formatted newsletter, resume, or term paper, tools for making it look good are always on hand. Page numbering, multiple column support, footnotes, charts, and watermarks are included in a clean and intuitive UI. When you open a new document, Pages offers more than 40 templates, including Club Newsletter, Business Letter, Three Panel Brochure, and even Restaurant Menu.

As you create a document, the Pages menu lets you add sections based on the template you have chosen. With the term paper template, for example, you can insert a chapter page, text page, or bibliography wherever you need it. If you need a TOC, Pages can create it automatically based on the formatting you've used. Headings become chapter titles, subheadings become sections, and so on, which is another great feature.



Pages doesn't offer all the features that Microsoft Word does, but Word has been adding features (and bloat) for more than two decades. For example, Pages doesn't have a change tracking feature, mail merge, indexing functions, or macro tools. Also disappointingly absent is the ability to do a word count on a portion of a document. (Pages can only do a word count for an entire document.) Although any one of these omissions could be a deal-killer for professional writers and word processing power users, average writers who focus on putting words on paper and laying them out might not miss what's not included.

An Export command lets you save your work in Word, RTF, HTML, and PDF formats. I found that documents with complicated layouts lost a lot in the translation to Word, HTML, and RTF files, and the importing application needed to reformat them. But Pages' HTML output is clean CSS-based code, which is far more elegant than the messy Web pages that Word generates.

Keynote is Apple's answer to PowerPoint. Like Pages, it focuses on presenting information with style. It offers what Apple calls cinema-quality effects, or transitions and animations, which can add a healthy dose of visual appeal to a presentation. These include burning-page and flipping transitions and animated text movement. Keynote includes 20 templates to start building your presentation, and they all look great.

Version 2 also adds a Presenter view that, similar to PowerPoint, lets you see notes, upcoming slides, and a timer on one screen, while the audience watches the presentation on a second screen. Keynote can also create self-running, interactive slideshows for kiosks or other automated presentations.

Keynote is easy to use compared to PowerPoint. Adding a page to a presentation is as easy as clicking the New button. You can change the page layout from a drop-down list of styles that fit the template and create between-page transitions by choosing an effect from a menu.

Both Pages and Keynote include a notable feature that's missing from Microsoft Office: printed documentation. There are more than 300 pages of clear and detailed information about the two programs. In addition, Pages and Keynote are nicely integrated with Apple's other applications. For example, you can drag an image into either program from iPhoto and then resize and position the image. Both programs also let you mask images rather than just crop them, so you can recover sections that you previously removed.

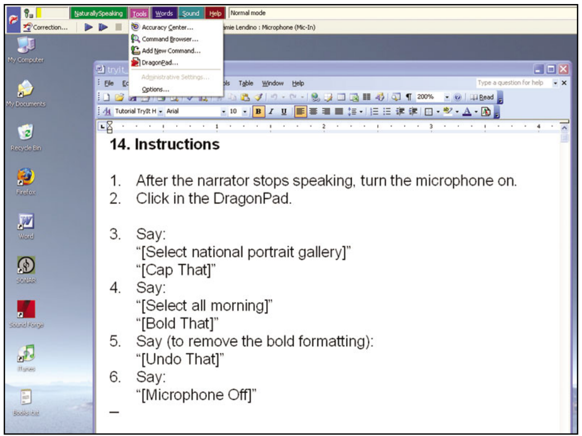
Of the two tools in iWork, Keynote is more mature, figuratively and literally, and can serve as a full-fledged replacement for PowerPoint. Pages' emphasis on layout instead of features for writing and editing could frustrate users who want to process words instead of making them look pretty. Still, home and small business users will find iWork '05 affordable, stable, and easy to learn—a refreshing alternative to Microsoft's tools.

iWork requires Mac OS X 10.3.6 or later running on a 500MHz G3 or later processor and a DVD drive. ▲

by Kevin Savetz

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

ScanSoft Dragon NaturallySpeaking 8



14. Instructions

1. After the narrator stops speaking, turn the microphone on.
2. Click in the DragonPad.

3. Say:
"[Select national portrait gallery]"
"[Cap That]"
4. Say:
"[Select all morning]"
"[Bold That]"
5. Say (to remove the bold formatting):
"[Undo That]"
6. Say:
"[Microphone Off]"
–

Dragon NaturallySpeaking 8
$99 (Standard); $199 (Preferred); $796 (Pro)
ScanSoft
www.scansoft.com

Voice recognition is a bit of a Holy Grail in the computer industry. People have wanted to vocally interact with their computers since "Star Trek," but even as CPUs have become faster, and software more sophisticated, the prize has been just out of reach.

NaturallySpeaking 8, first released in 1997, makes significant strides in voice-recognition quality and makes it conceivable that you can dictate letters and email, control basic system functions, and more without laying a finger on the keyboard. The latest Pro version boasts a new Roaming User feature for retaining settings on other machines; Smart Formatting tools for dates, measurements, and acronyms; and appreciated improved accuracy. (ScanSoft claims a 25% improvement from past versions.)

I tested the Pro Edition on a Dell Inspiron 8600 laptop with a 1.6GHz Centrino processor, 1GB of RAM, 60GB drive, ATI Radeon Mobility 9600 Pro Turbo with 128MB of video RAM, and built-in SigmaTel audio chip.

The Pro, Standard, and Preferred editions all bundle a nice Andrea NC-61 noise-canceling headset, plus program materials. The headset has two mini-jack connectors, one for the earpiece and one for the microphone. Installing the program from CD was quick, but the first time I started the program, I needed to train it to understand my voice. The program asks you to read some text aloud (I chose a Dave Barry column and chapter 16 from "2001: A Space Odyssey" from the menu), and it also scans your Documents folder and Outlook Sent items to understand your speech and writing patterns.

Operation was easy enough. When you launch the app, a status bar sits on your Desktop, and you just use your system as normal. When you want to issue a voice command or do dictation, you click the microphone icon and talk. Windows commands took effect almost immediately, but the program ran about one sentence behind my actual dictation in Word. Lacking immediate visual feedback, I learned to just trust the program and talk.

Initially, I was a bit on edge using the program, watching the screen to see which sentences it transcribed correctly and which ones it didn't. Hang in there, though. As you get more comfortable with NaturallySpeaking, your dictation speed will improve markedly. I spent a lot of time at first with the program's Accuracy Center, which has dozens of detailed menu items geared toward improving voice-recognition performance. It was pretty amazing that NaturallySpeaking could handle my Brooklyn accent at all, but training is the key to improving accuracy.

Once I went beyond the program's minimum requirements and did additional training, it worked really well. I threw everything I had at it, including speeches, news, historical material, and email dictation. Impressively, NaturallySpeaking consistently picked up proper names (Dean Acheson, Coney Island, President Clinton, and even General MacArthur) that could have been spelled several ways depending on the context.

The program's transcribing feature was particularly impressive. You can use any ScanSoft certified microphone or voice recorder (see www.scansoft.com/naturallyspeaking/support/compatibility for a complete list) to conduct interviews or create notes in WAV files. The application read the files and transcribes them into a Word document. Unfortunately, the app only supports 16-bit mono, uncompressed WAV files. An MP3 recorder won't cut it without doing a conversion first.

After about two hours of training, NaturallySpeaking was running at an outstanding 97% accuracy rate. It still required a few corrections here and there, but the program is fabulous at what it does. Technophiles will probably find it easier and faster to stick with the keyboard, however, as the app may be a better fit for executives who aren't tech-savvy, small-business owners, and those who are unable to type.

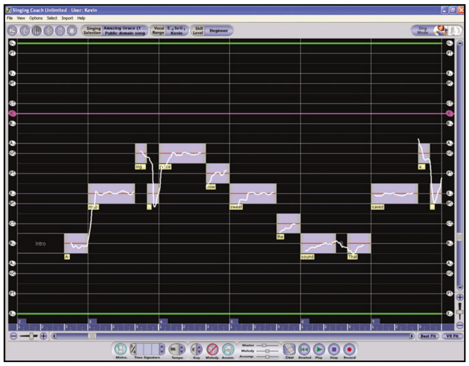
The Preferred ($199) and Standard ($99) editions bypass such corporate features as macro building and array microphone support, but they retain the program's high accuracy and transcription abilities. Overall, NaturallySpeaking 8 should be your top voice-recognition choice; it's far and away the best program for this purpose available. Commander Riker would be impressed. ▲

by Jamie Lendino

After about two hours of training, **NaturallySpeaking** was running at an outstanding **97%** accuracy rate.

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Carry-A-Tune Technologies Singing Coach



Singing Coach
$49.95 (Standard);
$99.95 (Unlimited)
Carry-A-Tune Technologies
www.carryatune.com

Everyone sings; whether it's in church or just in the shower. Singing Coach is a fun program that can help you sing better by learning to control your voice and evaluate your own singing.

The program's two main parts are lessons and a Singing mode. In both, you sing into an included headset microphone, and the app shows your actual pitch compared to the note you're trying to hit. You can view notes as sheet music or a graph.

The 20 lessons take a few hours to complete and show how to use your voice and stay on key. They can be repetitive, but humor makes them enjoyable. There's a downright-funny introductory cartoon and humorous 1950s-style educational film about breath control. The lessons are thorough without much emphasis on music theory but might be too easy for some. I'm not an extraordinary singer by any means, but I frequently scored 97% to 100% during the tutorial.

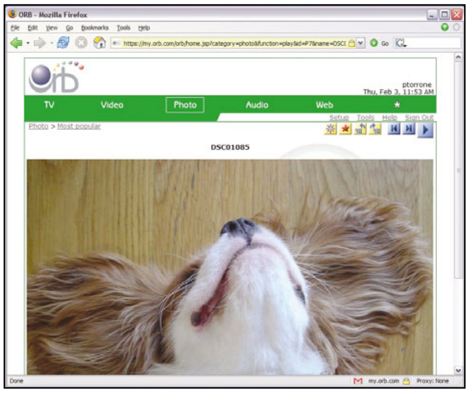
In Singing mode you can change the difficulty level. Intermediate and Advanced levels have less tolerance for off-key singing. A pitch meter moves as you sing, letting you quickly adjust if you're off-key. When the song is done, the app scores you based on your pitch and difficulty. You can play the tune back and hear your voice as others hear you. Singing Coach adapts itself to your vocal range, so lessons and songs play in a key you're comfortable with. (Turns out that I'm a baritone.)

The Standard version includes 12 built-in songs, and you download four more free. (You'll be singing lots of familiar tunes, such as "Amazing Grace" and "When The Saints Go Marching In.") The Unlimited version includes 24 songs and 12 free downloads, and you can import MIDI files and compose your own tunes.

Singing Coach can only take you so far, but it does a great job showing your pitch and tempo relative to where it should be. ▲

by Kevin Savetz

Orb Networks Orb



Orb
$9.99 (monthly); $79.99 (flat fee)
Orb Networks
www.orb.com

"Play. Anything. Anywhere." That's the tagline for Orb Networks' new mobile media service, and it sums things up nicely. Orb works with a Windows Media Center PC, broadband connection, and Internet-connected mobile device to give you access to all of your media files at any time.

Getting started is surprisingly simple. Sign up for an account (new users get 30 days free), download the software, and install it on your Windows XP Media Center PC. Orb automatically finds all your media files, including MP3 music, digital photos, and TV shows. (Live TV is supported with an optional TV tuner.) To access your files, just sign in to your Orb account via your mobile device, including laptop, Windows Mobile or Pocket PC handhelds with Wi-Fi access, Windows Smartphones, and various Nokia phones with RealPlayer or Windows Media Player loaded.

The concept is brilliant, and I had no problems in my tests. Orb simply works. There were instances where it was difficult or impossible to get an Internet connection with a mobile phone, but that was due to poor cell phone coverage in some areas. Wi-Fi worked best with mobile devices, providing good speed without the spotty coverage issues inherent in cellular technology. For security, your files stay on your PC and aren't uploaded to Orb's servers. No firewall changes are needed, and when you access your files, data is sent via 128- or 256-bit encryption.

Orb's price is reasonable, considering the time you can save accessing media files by not having to save your movies and music to a memory card or drive. After the free trial expires, the service is $9.99 a month or $79.99 a year. You can add users to your account for $3.99 a month or $29.99 a year. As of this writing, Orb doesn't support Palm OS devices or any desktop OS but Windows XP Media Center. ▲

by Jen Edwards

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Podcasting: Evolution Or Revolution?

by Chris Pirillo

I've been in the tech trenches over a decade, so I've seen my share of spikes and dips. I was there when RSS started to gain momentum, being the first to claim "email is dead"—this after authoring the definitive book on email publishing in the late '90s. I'm not a Johnny-come-lately. There are several reasons why I believe podcasting is an evolution.

When I hosted my radio show on WHO AM 1040 in Des Moines, Iowa, my business partner (Jake Ludington) offered the program online in MP3 format after the live broadcast. The average first-day download stat was around 3,000 complete transmissions. That was in 2000, when broadband was still coming down in price and catching on. Could you listen to that file on your desktop, laptop, and/or portable media device? Yep.

Awhile ago, I created a WMV of the MSDN Channel 9 guy whose boss is Lenn Pryor. I blogged and linked it as an "enclosure" in my RSS feed. Within hours, I received a positive email from Lenn. People downloaded, linked, and shared it. It would have been a videocast had there been software that enabled the subscription of the feed on a video-enabled system. Wait, there was; it's called any news aggregator that supports enclosures. Portability and automated transfer to such a device are the missing pieces.

Podcasting is just a process—software that places data where it's most convenient. RSS 2.0 has supported enclosures for months, and smarter news aggregators have since supported automated downloading of enclosures. So, what's new? Nothing. We have the same ingredients, with the final step in the recipe dictated by portable-friendly software. It's evolutionary by definition—period.

So why did it set the world on fire? It could be Adam Curry, its initial developer and reigning champion. Could be Gnomedex 2004, where Steve Gillmor hammered it home and where Eric Rice started doing AV stuff again. Could be the concept's namesake. You don't need an iPod to record *or* receive a podcast, which is why I dislike the word so much.

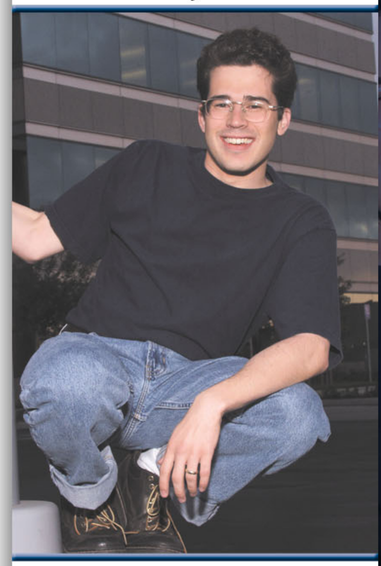
Jake and I were planning to relaunch The Chris Pirillo Show long before the podcast fire was lit. The new news aggregators made it even easier to deliver our audio-based data to anyone who knew what was going on. We opted to offer an alternative format in Windows Media because we found a sponsor in Windows Media and because WMA is superior to MP3 in audio quality at the same bitrate. We've ripped through two silent podcasting tenets: using a format other than MP3 (specifically one not iPod-compatible) and blatant commercialism.

Windows Media was all over it. We're putting its brand where it may not have existed before. Microsoft released Sync & Go as a part of its Plus! pack years ago, but it didn't catch on because it was a closed system and the Pocket PC never captured the culture's imagination. "Closed system" are the key words. RSS isn't owned by one person, and you don't have to go through a company to use it. The mechanism of syndication also isn't controlled by one channel.

How do you make money with a podcast? Socratically, how do you make money with a regular radio show? You sell impressions, branding, positioning, partnerships, and everything in your cache across your media network. Clear Channel owns lots of stations, but the Internet's dial goes beyond 11. Lockergnome.com has several opportunities for sponsors: email newsletters, RSS feeds, Web pages, conferences, ebooks, exclusives, conference calls, and audio shows.

A podcast isn't new; it just has that new car smell, which wears off. Without a direct or indirect financial compensation, most podcasts are doomed to fade in less than a year. Everybody needs to get paid for his work and time. Hobbyists may be content to have their ego stroked on occasion, but the smart talker ain't gonna give away the milk forever. I have great respect for those who helped catalyze the podcasting space: Curry, Dave Winer, etc. They've made it possible to do many "impossible" things. Neither may see this, and they're likely to disagree with several of my opinions, but at least I'm trying to give credit where it's due. ▲

You can dialogue with Chris at chris@cpumag.com.



Chris is the founder and publisher of Lockergnome.com, a technology Web site and content publishing company with more than 1 million subscribers. Chris' annual tech convention (Gnomedex.com) continues to draw record crowds, and he recently launched the TheChrisPirilloShow.com audio broadcast for enthusiasts. Produced independently from those who rule your radio dial, even his partners know the value of letting you take this knowledge with you wherever you may roam. Live and prerecorded caller questions; interviews with people who matter; killer new software finds; productivity tips and tricks; thoughts from a female novice's perspective; mini-conferences with two-minute guests; and more. Take a listen today.

It's evolutionary by definition —period.

Open Sauce

My Free Logo Adventure

by Pete Loshin

If French is the language of love, Logo is the language of learning—and not just learning to program, either. Elegant and simple, Logo is endlessly extensible and a powerful tool for study at almost any educational level, from elementary to post-doctoral.

If you think Logo is kid stuff, think again. Seymour Papert, mathematician, educator, and co-founder of the MIT Artificial Intelligence Laboratory, designed Logo as a programming language easy enough for kids to pick up quickly but sufficiently robust to serve as a platform for computing projects of almost any complexity.

Programming in Logo means using the "turtle," an entity that lives in the Logo environment and responds to commands you give it, either interactively at a command line or through interpreted programs. For example, tell the turtle to go forward 50 units on-screen with the command fd 50 or turn to the right with the command rt 90. Real programming comes quickly with loops (repeat), conditionals (if), and procedures.

Logo works well for teaching geometry. Create a line by telling the turtle to draw as it moves forward. Create a square by telling it four times to draw a line and turn 90 degrees. Robotics is just as well-suited to Logo. Just turn the virtual turtle into a real robot. Research on "programmable bricks" at MIT during the 1990s produced the Lego MINDSTORMS robotics kit powered by Logo.

My own first Logo was Brian Harvey's Berkeley Logo (aka UCBLogo; see www.cs.berkeley.edu/~bh), bundled with the book "The Great Logo Adventure" by Jim Muller. Dig in at www.softronix.com for a downloadable version of Jim's kid-friendly Logo intro. Try Brian's three-volume "Computer Science Logo Style" for a rigorous introduction to serious programming at the Berkeley Logo site.

SUSE Linux (my favorite) often chokes when compiling apps such as Berkeley Logo from source, so I sought out a new Logo experience.

Only two—NetLogo from Uri Wilensky of the Center for Connected Learning and Computer-Based Modeling at Northwestern University (ccl.sesp.northwestern.edu/netlogo) and StarLogo from the MIT Media Lab (education.mit.edu/starlogo)—met all my needs. No. 1, my Logo must run under Linux. Other No. 1, my Logo must be free. And my final No. 1, there must be an active project with a community of users and developers.

Where UCBLogo offers a basic interface to control and watch the turtle, NetLogo and StarLogo both make it trivial to create and control many turtles, making it dead simple to simulate large population behaviors. Both come with Logo code for modeling bird flocking, prey/predator population variations, gas molecule diffusion, creating fractal images, demonstrating mathematical and statistical theorems, and much more.

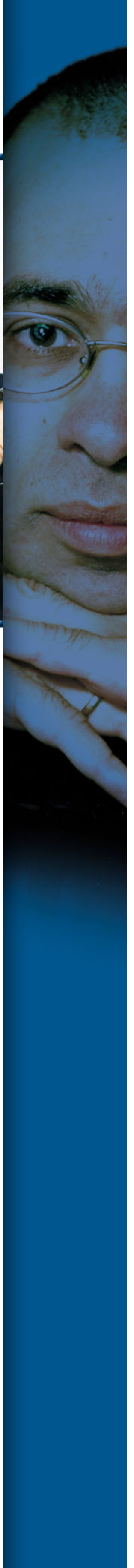
The biggest hurdle? Understanding that to program turtles, screen patches, and overall ("observer") behaviors, you issue commands in different modes. But once sorted out, it becomes almost trivial to tweak programs by adding, changing, or removing procedures. As Java apps, NetLogo and StarLogo both run everywhere, so choice is as much a matter of taste as function. I'll continue using both as I climb the programming learning curve.

I could have bought a commercial Logo, and there are some very impressive looking commercial implementations available (mostly for Windows, sadly), but that's not my way. Whenever I buy software, I read the box or other promotional material, and I buy into the product; it's going to change my life, so I'm happy to spend my hard-earned bucks for it. But after the install comes the disappointment. My computer runs no faster, nor can it do much more than before. I still must study the new program to make it work, and the license precludes returning it if I'm unsatisfied or selling it to someone else for whom it may work better. And the revision that solves all my problems is invariably due just six months hence.

Free software never disappoints. If it helps at all, I'm happy. I've gotten more than my money's worth, and I never suffer buyer's remorse. Perhaps a commercial product could do so much more, but it's still a gamble. I'd rather go for the sure thing.

Got Linux woes? Email me at linuxtrouble@loshin.com with details and I'll do my best, and the most interesting tale will be featured in an upcoming column. ▲

You can get saucy with Pete at pete@cpumag.com.



Pete Loshin, former technical editor of software reviews for Byte Magazine (print version), consults and writes about computing and the Internet. He also runs www.linuxcookbook.com. He owns shares of both Microsoft and Red Hat and believes that Windows isn't for everyone, but neither is Linux.

> Programming in Logo means using the "turtle. . . ."

BRILLIANT • BETTER • **BENWIN**

ECCO 5.1 DX
Wireless Remote Speaker System

Photo: © 2004 SchafferPhotography.com, All Rights Reserved. © 2004 Alltek Vision, All Rights Reserved.

If the style doesn't win you over, the perfomance certainly will.

Add something special to your digital life with a Benwin 5.1 Hi Fi Wireless Remote Speaker System featuring instant digital surround sound.

- One minute Plug and Play set up.
- No amplifier, receiver, or digital decoder required.
- Turns any stereo system into an instant digital surround sound system.
- Compatible with gaming platforms, portable audio devices, notebook and desktop computers.

Risk Free 30-Day Trial. Money Back Guaranteed.

Benwin will be at 2005 International CES®.

Call to book your private demonstration

Toll-Free: ***888-9-BENWIN***

NO AMPLIFIER REQUIRED

NO RECEIVER REQUIRED

PP Plug and Play

CLASS D DIGITAL AMPLIFIER TECHNOLOGY

ARC 5.1 DX

FX 5.1 DX

ECCO 5.1 DX

BENWIN

THE NEW ERA OF SOUND

www.benwin.com

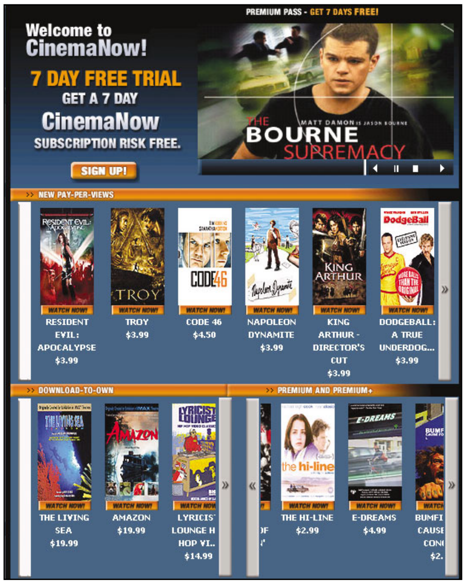
CINEMANOW

Tomorrow's Video Store Today

Want to watch "The Toxic Avenger"? or "DodgeBall"? Don't bother with video stores or online rental companies. They're so 2004. With a broadband connection, you could watch these or 7,000 other current and catalog videos in 640 x 480 resolution and still be able to pause, rewind, or even watch portions of the film one day and return to complete it the next. At Cinema-Now (www.cinemanow.com) VOD (Vid-eo-On-Demand) over IP is starting to look like the video store of the future.

Beyond The B-Movie

Formed in 1999, CinemaNow used to deliver z-grade public domain films and indie slasher pics in fuzzy display resolutions and burpy bit rates. Not so anymore. Today's CinemaNow technology is remarkably sophisticated, and most of us have the bandwidth to support its features such as 700KBps video bit streams, delivery of HD content, and viewing massive 500MB movies while they download to our hard drive. And now Microsoft, Cisco, and Blockbuster have invested in the company, and also, many major studios have released some of their A-list titles via Internet VOD at the same time they send them to real-world video stores.

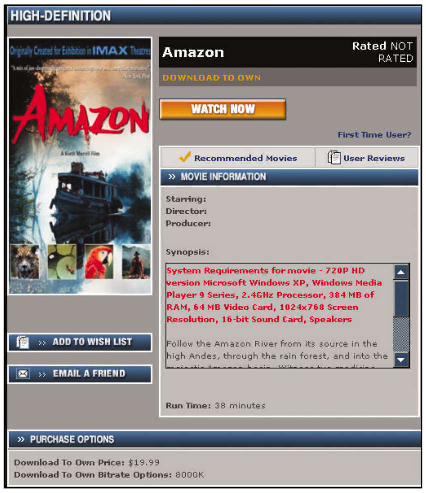


VOD (Video-On-Demand) over IP gives customers instant access to a virtually unlimited library of films that they can rent, buy, or view as part of an ongoing subscription.

These companies are involved in CinemaNow because the writing is already on the wall: Broadband will be the video rental device of the future. Precisely when that future comes may be unclear, but you can get a glimpse at CinemaNow. From the Web site, you get pay-per-view access to titles ranging from $1.99 to $4.99 and 24 to 48 hours to view the film via a live stream or downloading it to your hard drive. CinemaNow strives to re-create the real-world DVD market by offering multiple buy-ins: a $9.95/month subscription for unlimited access to hundreds of select films, an option to own some movies you download, and a boxed set that lets you rent or buy groups of TV episodes. CinemaNow uses Microsoft's Windows Media Player 9 and 10 file formats and its digital rights management protocols to manage your time-limited access to material.

VOD Life Cycle

Creating the VOD interface of the future is a complex, bandwidth-intensive task, especially when you're selling movies. Traditionally, films are released under intricate territorial rights and release windows that restrict where and when CinemaNow can rent or sell any given flick. So, CinemaNow had to re-create online a worldwide distribution system that obeyed all of these rights and rules. For instance, the Web site uses geo-targeting to identify a users' general location by their IP address and ISP and then serves up a version of the site and film catalog that is licensed to that territory.



Starring:
Director:
Producer:
Synopsis:
System Requirements for movie - 720P HD version Microsoft Windows XP, Windows Media Player 9 Series, 2.4GHz Processor, 384 MB of RAM, 64 MB Video Card, 1024x768 Screen Resolution, 16-bit Sound Card, Speakers

Follow the Amazon River from its source in the high Andes, through the rain forest, and into the

Run Time: 38 minutes

Download To Own Price: $19.99
Download To Own Bitrate Options: 8000K

CinemaNow makes high-definition iMAX films available for download and viewing.

In order to manage such a complex rights management system and move massive amounts of film data to users, CinemaNow has to be both smart and muscular. The company's brain is PatchBay, a proprietary API, which occupies four company servers.

The movies exist apart from the PatchBay servers and live among several CDNs (content delivery networks). CDNs house CinemaNow's files at the edges of the Internet in mirrored servers around the world that are closer to end users. Studios send films to CinemaNow on digital tape or DVD formats, which the company encodes to the Windows Media format in multiple sizes for the 100KBps/300KBps/700KBps streams it makes available. File sizes can reach 2.2GB for the newer HD material that runs at 720p display resolutions. Each film comes with data that contains every detail about the film, such as plot synopsis, director, actors, etc., and all of the territorial rights, release windows, and pricing associated with that film. A PatchBay Packager then assigns each file a unique key in the PatchBay servers that the database uses to issue end users the right license. PatchBay can then reach out

Q&A

Curt Marvis: Cinema Now! Cinema Everywhere!

CPU: Who is the typical CinemaNow customer?

Marvis: The current members skew slightly more male and slightly older than you might expect. College and younger age kids are populating the illegal sites. There is still a big market that exists for people trying to find content for free, so our demographic is more in the 24- to 40-year-old bracket than in the younger ones.

CPU: Microsoft envisions a Windows-based home media server pushing media throughout the home. Do you share that vision?

Marvis: I think the home that Mr. Gates has been proposing is finally starting to sell the concept of a server in the home of the future sitting next to the water heater as the central hub for ingesting content and information through a wireless network to whatever viewing device. That absolutely is what is happening.

CPU: Is there much traction for portable movie viewing outside the home?

Marvis: I met with a manufacturer of car equipment that showed me the Suburban in the garage that fits Wi-Fi downloads of movies on a hard drive in the car for the trip with the kids. This will happen with things like cars and portable devices and linking into a variety of flat screens. Ten years from now it will be an extraordinarily different marketplace where tens and hundreds of thousands of pieces of content will be on demand. I won't have to be in front of my TV to see that [missed] show.

CPU: Are most users watching movies on their PCs or linking to the home theater?

Marvis: We estimate about 15% of viewing is not on the PC. Where the business is growing is on a huge number of devices that will take content from the PC and move it to the living room and portables. We do a promotion with Creative Labs for the Zen Portable Media Center to get two free movies. The take-up rate is huge. There is PC-to-TV, but there's no sort of IP device that is going to hit the market that everyone is going to replace. A huger number of companies have a significant interest in creating devices that can do that, whether it is Linksys with a video-based adapter or an integrated set-top box from a telco that allows IP-delivered content or a network DVD player from KISS technology to let DRM content be burned and played. We will see a lot of different devices enter the market this year and in 2006. This will become a mass-market business when you receive IP content to see in the living room. ▲

to the CDNs and send the movie from just about anywhere on the CDN.

When you first access a CinemaNow stream or downloaded film, WMP hits the PatchBay servers first to acquire a license that tells WMP how and for how long it can play back the movie. On a download limited to a day's rental, for instance, PatchBay issues WMP a license that will run the file from your hard drive for 24 hours from the first time you hit Play. Also, the PatchBay system records how often movie studios' content is downloaded or viewed and how much you pay for it, precisely the kind of information the studios expect from bricks and mortar retailers, cable movie channels, and movie theaters.

Built To Last

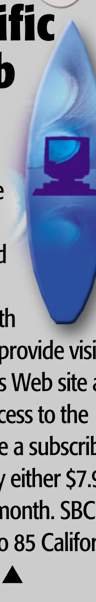
The genius of PatchBay is that it was built for an uncertain future. No one really knows how films will be distributed in a more digitized world, let alone what file format will be used and which devices people will use to view them. Curt Marvis, CinemaNow CEO, expects a future of movie viewing on handhelds, in SUVs, and in the living room, all of which will be fed by broadband distribution. And CinemaNow is not without serious competition from online pay-per-view venues such as Starz.com and MovieLink.com; however, Marvis claims his library is bigger and his technology sprier. And so, CinemaNow technology was designed to separate the content delivery from its management. As a result, CinemaNow remains platform and device agnostic. If the system needs to support DivX in addition to Windows Media formats in the future, the back-end API is generic enough to handle it.

For Marvis, that means providing movies whenever and wherever consumers want them. His recent industry partnerships will bring his film library to MSN TV's upcoming Internet TV set-top box. CinemaNow already runs a portal specifically for Windows XP Media Center machines, and it encodes movies in special 100KBps or 500KBps formats to fit full-length features into the new Portable Media Centers from Creative Labs and others. Marvis is even considering short film distribution on 3G mobile phones services. "Our strategy is CinemaNow everywhere, no matter what broadband service you are using, no matter what hardware, no matter what portal you might use or e-tailer or retailer. We want to be partnered with those people to be front and center," he says. We're way beyond just renting VOD over broadband and skipping that trip to Blockbuster. That's so 2005. We're talking about bringing the video store with you no matter where you go. That's so 2010. CPU

by Steve Smith

Infinite Loop

Surf The Pacific And The Web



Wi-Fi made its debut on beaches in San Diego County. San Elijo State Beach is the first of several area beaches to be equipped with the Wi-Fi service. SBC Communications teamed with the California State Parks to provide visitors free access to the state park's Web site and ReserveAmerica. To have access to the entire Internet, users must be a subscriber to SBC's FreedomLink or pay either $7.95 for one day or $19.95 for a month. SBC plans to extend this service to 85 California parks in the next two years. ▲

Source: www.signonsandiego.com/news/northcounty/20050126-9999-1mi26wifi.html

Department Of Stuff

blogging.txt

by Rob “CmdrTaco” Malda

Blogging was probably the biggest hype online in 2004. From the Dean campaign through the entire election, we saw the effect of a million small voices speak with a volume that, up to this point, was only associated with the mainstream media. Where will this go in 2005? And beyond? And perhaps more importantly, where do we want it to go?

Blogging levels the playing field between the big time journalist and the common everyday man. Online, my words are just as strong as yours. Tools are slowly coming together to aggregate the words of the masses to determine what is happening and to gauge public opinion on key issues.

But the more I look at this, the more I wonder. Don’t get me wrong, I’m no elitist when it comes to the gatekeeper role of the traditional media. I think that the voices of the masses are absolutely critical, and the Internet will finally unleash that power. That fundamental opinion is the driving force behind Slashdot—a site where everyone can (and does!) pitch in his two cents on everything that happens.

I think it’s critical that we understand a very important role that the mainstream press fills today that blogging does not yet replace. That role is that of editor. You don’t think about it because you don’t typically see editors’ names, but they are doing something very important. They are simultaneously the problem with the mainstream media and its last hope for relevance in an age dominated not by newspapers and channels, but by individual personalities.

Journalists have a job to do. They research their stories. They check the facts. They get quotes. They contact sources. They do serious research. And when this is done, they present the story, providing us with context and objectivity. Telling us what happened, and why it matters.

A journalist can write in a blog. A blog is simply the medium for publishing. But the simple fact is that journalists are not using the vast majority of blogs as a journalistic tool. They are much more akin to a public diary. Opinions rule over facts. Please understand, I think that both of these things are fantastic uses of the Internet, but there is a critical problem.

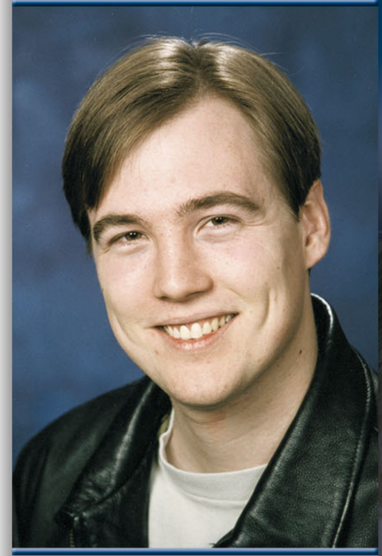
How do you or I tell them apart? Today if you read this magazine, you know that someone picked me to write something for you. Essentially you have given him permission to let some information into your brain, and he chose me to do it. You assume that he has read bylines and resumes, and his choice lends credence to my words.

This editorial role doesn’t necessarily exist online. Google isn’t doing it. When you search for keywords, you find a blog that may be about the subject you are seeking, but there’s no way for you to know if it is a work of journalism, punditry, opinion, or just simple ranting. The Internet is full of all of these, and you’re forced to distinguish them on your own.

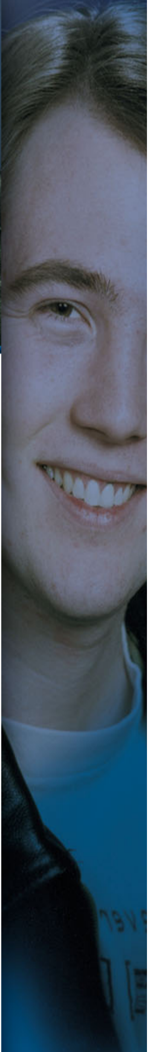
The mainstream press is in jeopardy today. Classified ads are done better online. The funny pages are moving to individual Web sites. The breaking headline is distributed any number of ways faster than CNN or *The New York Times*. As each of these functions gets chiseled away from the traditional press, what is left is the single most important part: the role of the editor. The gatekeeper. So far no online service has been created that properly fills that role.

If we don’t sort it out, as blogging becomes louder, we’ll simply end up with more noise and less information. And, as newspapers and TV become less relevant as their core functions are chiseled away by dedicated online services that do each better, we’ll be left with a million blogs that say a thousand things, but no way to find them. It’s a rosy future and a great opportunity. ▲

Bounce a few emails my way at malda@cpumag.com



Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the ’Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.



When you search for key words, you find a blog that may be about the subject you are seeking, but there’s no way for you to know if it is a work of journalism, punditry, opinion, or just simple ranting.

Caught In The Web-Forward Slash

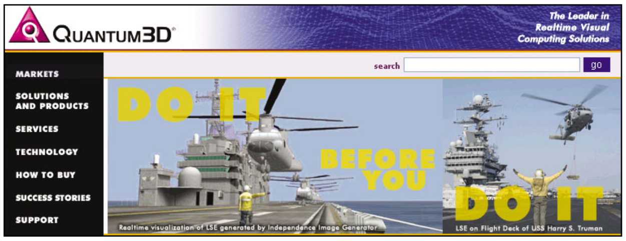
A Girl & Her Toys

by Joan Wood

As founder and president of indy game developer Mango Grits, she talked 3Dfx out of prerelease Voodoo hardware to develop flying game Barrage for Activision then co-founded and ran hardware review site SharkyExtreme.com as managing editor. She currently plays with small, wearable PCs and big, rack-mount visual simulation image generators for Quantum3D while secretly plotting to save the world through a series of international location-aware multiplayer handheld games.

There is no easy way to do this, so it's probably best to just 'fess up and spill some beans. It's not a secret or anything—my husband approves, my editor understands, all of the technology companies I deal with are fully informed—but I hadn't actually spelled it out completely in print yet: Since last summer (August 2004; page 87), I've been living a double life.

From my developer days, I've known big-time pixel-pusher Quantum3D (www.quantum3d.com) since it was hatched out from under 3Dfx. Over the past eight years, it has grown from consumer graphics cards to big iron IGs (image generators) and the scene management software to run full throttle visual simulations. I've always been a sucker for marvelous toys and late last spring when Q3D came calling, I couldn't resist.


QUANTUM3D
The Leader in Realtime Visual Computing Solutions
MARKETS
SOLUTIONS AND PRODUCTS
SERVICES
TECHNOLOGY
HOW TO BUY
SUCCESS STORIES
SUPPORT
search
go
DO IT BEFORE YOU DO IT
Realtime visualization of LSE generated by Independence Image Generator
LSE on Flight Deck of USS Harry S. Truman

Oddly enough, it wasn't just its giant multiple PC-powered Independence IG hardware that got me (though it is quite compelling to fly over high resolution, geo-specific terrain or open ocean with full weather effects and insane antialiasing), it was the small, wearable THERMITE computer that did it.

Perhaps because I spent more than a decade trekking about the globe with a bunch of video hardware strapped to my person, I have a particular fondness for wearables. At 2½ pounds and more I/O than I'll ever need, THERMITE is rugged, compact, and a wearable computer geek's dream machine.

Designed and built for all kinds of commercial, military, and civilian applications, it currently has the most advanced 3D and video capabilities of any wearable. Now that it has been bundled into Expedition, a wearable load-bearing vest training ensemble with correlated motion trackers, weapon-mounted synthetic environment control inputs, and integrated HMD, surround sound, and wireless communications, things are getting even more interesting.

So interesting in fact that when Expedition was announced (as a "comprehensive, integrated, open-architecture, COTS man-wearable embedded training platform") it got Slash dotted. Fanned or flamed, I guess I can't really pretend any longer that at least some of the folks I write my column for really have no interest in the technology I work with every day. My apologies for not coming out sooner—let the bean-spilling commence!

What do I think is most wonderful about all this technology? For the embedded market, meaning systems that reside in a vehicle such as a jet cockpit or a tank, the amazing part is how advanced computer graphics have introduced a whole new level of versatility, allowing for training to be built into the vehicle or for the computer to be removed and worn when leaving it. Some of the software has become so compact and nimble, it can run on anything from a full IG to a PDA, with any OS.

On the IG side, I think the best part is taking the results of billions of dollars spent on R&D by graphics companies to make amazing GPU technology for gamers and turning it into stuff it wasn't originally designed to do. Like harness multiple PCs with advanced synchronization technology to generate remarkably realistic, high resolution, high frame rate, antialiased synthetic environments, and being able to integrate the next generation graphics technology only a few months after it is available at Fry's. This means that military and commercial simulators can utilize new features as soon as the software supports it. This is a far cry from where simulation was even five years ago, when everything was proprietary, technology took years to evolve, and had no direct correlation with the rapid advancement in features driven by the game market.

This is the high end of high end, and gamers are still driving the jet. It's also the only way I might someday be part of the space program. Tally-Ho. ▲

At 2½ pounds and more I/O than I'll ever need, THERMITE is rugged, compact, and a wearable computer geek's dream machine.

Blast joan@cpumag.com

ROAD Warrior

by Jen Edwards

Getting Local, What We (Already) Know About Cell Phones & Driving, PDAs For Census-Taking & More From The Mobile Front

Mobile Phones & Driving Don't Mix

A recent study conducted by the University of Utah and published in the quarterly journal *Human Factors* provides evidence that using a cell phone while operating a motor vehicle can be deadly. (Tell us something we didn't know; it's estimated that the distractions from using a mobile phone while driving result in 2,600 deaths and an astounding 330,000 injuries each year.)

What had not been so clear until now was exactly why. The study, which involved participants performing simulated driving tests, details that when people talk on a mobile phone and drive at the same time their reaction time is greatly reduced. According to the study, an average 20-year-old driver talking on a cell phone has the same reaction time typical of a 70-year-old driver not talking on a phone. The 20-year-old generally leaves a slightly larger following distance while driving, which tends to increase safety, but these drivers were also almost 20% slower in their reaction times to brake lights ahead of them, which could potentially result in a rear-end collision.

Cell phone use in cars has been banned in many areas altogether, and in other areas the use of a hands-free kit is required to use a mobile phone while in a car, hopefully keeping the driver's attention where it belongs—on the road. But previous studies from the researchers (and corroborated by independent research) have found that drivers are still distracted while having a conversation while on the phone, whether they're actually holding the phone or using a hands-free headset. ▲

Next Census A High-Tech Endeavor

The U.S. Census Bureau is expected to accept bids for a contract to equip more than 500,000 census counters with handheld devices for the 2010 census. Talks have been taking place for more than a year with several vendors concerning a proposed request for a Field Data Collection Automation contract due by June. The contract is expected to be worth $300 million or more.

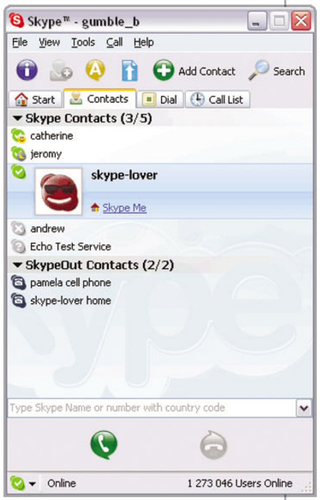
The idea is to make data gathering quicker and more efficient by providing census workers with PDAs equipped with mapping functions. Several different handhelds could potentially be up to the task, including the Garmin iQue, which features a built-in GPS navigation system, as well as other Palm OS and Windows Mobile handhelds that can accept GPS peripherals in an expansion slot or can communicate via wireless technology.

The contract is expected to cover custom software for taking census data, as well as help desk and other support services. This will not be the first time that handheld electronic devices have been used to collect census data; a limited pilot program was done in 2004 in New York and Georgia to better determine how technology can streamline information gathering in the field. ▲

A handheld, such as this Garmin iQue, equipped with special census-taking software could be the answer for conducting a more efficient U.S. census in 2010.

Will Google Launch A VoIP Service?

Rumors are making the rounds regarding the potential of search giant Google offering a VoIP service. VoIP, which involves placing calls using a handset and software, is favored by some users because it offers less-expensive calls than traditional wired networks can. Analysts are speculating that a potential Google VoIP service could work similarly to what Amazon's A9 search service offers, but with an advertiser-sponsored setup akin to Google AdWords.



Some of the speculation that is surrounding Google has risen because of a recent job posting the company made for those with experience making "dark fiber" contracts for a global network. Such a network, however, could simply be a means for Google to cut costs and better manage the massive amounts of data it collects for its search engine. Google hasn't officially stated what its plans are regarding launching a VoIP service or if it even has any.

Calling all geeks. In other VoIP news, Skype recently announced that it has expanded its VoIP service to Mac OS and Linux platforms with 1.0 versions. Skype previously was available only for Windows computers and in beta version for Mac OS and Linux. The new distributions should greatly expand the number of users of Skype's service. Skype claims to already have more than 23 million users, adding 130,000 users a day.

Both versions feature Skype to Skype calling for person-to-person or conference calls for up to five users and the SkypeOut service, which lets users call anywhere in the world at local rates; thereby eliminating long-distance calling charges. Several other features round out the packages, including contact directories, calling logs, instant messaging, file sharing, and contact status indicators. The Mac OS and Linux betas versions have evidently already proven popular, with Skype reporting more than 1 million downloads of the betas versions. The Linux version has been tested with several different distributions, including SUSE, Xandros, Gentoo, and Fedora Core 2. ▲

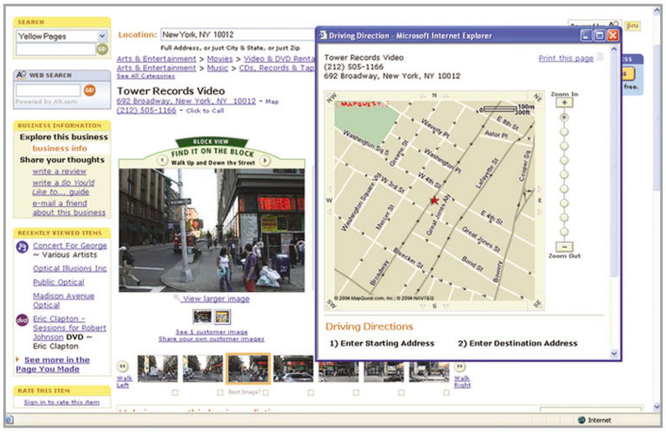
Global Web Becoming More & More Local

We all know the Internet puts an amazing amount of worldwide information at our fingertips. With it you can do everything from research the best price across hundreds of retailers for that video card you have your eye on, to book vacation travel plans to exotic destinations, to help your child with her homework assignment on the Great Wall of China. But the Internet is also becoming increasingly local, evidenced by several recent developments.

In January, Amazon's A9 search engine unveiled a new Yellow Pages feature that lets users virtually "walk the streets" in several major cities, including Atlanta, Boston, Chicago, Dallas, Denver, Los Angeles, New York, San Francisco, Seattle, and Portland. To create the pages, drivers in trucks equipped with digital cameras, global positioning systems, and other software and hardware drove thousands of miles throughout the cities taking millions of pictures. The photos were then matched to local businesses and restaurants. More virtual portraits of other cities' businesses are expected to be added in the near future.

One interesting aspect of the service is the ability to directly contact a local business via the returned search page. Instead of entering a phone number and making a long-distance call, however, you can click a link in the business' listing and use a VoIP service to connect with the company.

Via SMS. In related news, Yahoo! may not have a photographic Yellow Pages feature, but it is enabling users to send information about a local search directly to their mobile phones via SMS. For example, you can look up information on Yahoo! about a restaurant or business, and rather than write the information down or copy and paste it to an email, you can click a Send To Phone link to send an SMS message to a phone number you choose. The service is free, although some wireless carriers may charge a small fee to receive the message. Rival search engine Google has been testing a similar service since late last year. ▲


Yellow Pages
Location: New York, NY 10012
Driving Direction - Microsoft Internet Explorer
Tower Records Video
(212) 505-1166
692 Broadway, New York, NY 10012
Print this page
FIND IT ON THE BLOCK
View larger image
Driving Directions
1) Enter Starting Address
2) Enter Destination Address
Zoom In
Zoom Out
Internet

Want to know what the neighborhood looks like before you even get there? Check out A9.com's new Yellow Pages feature.

Compiled by
Samit G. Choudhuri & Chris Trumble

At Your Leisure

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest in PC entertainment, DVDs, consoles, and just stuff we love and recommend, read on.

A/V Corner *Movies by Samit & Music by Blaine*

$29.95
Universal Studios
www.raymovie.com

Ray (Limited Edition)

To say Jamie Foxx channels the late Ray Charles in "Ray" sounds cliché, but it's a perfect description of what you see. This two-disc Limited Edition (also in widescreen, full screen, and DVS enhanced for the visually impaired) release has a solid anamorphic transfer with above average 5.1 audio. The theatrical version is self-explanatory, but the extended version adds unpolished deleted scenes back in. Director Taylor Hackford's audio commentary is insightful, and the second disc (included with the Limited Edition only) contains all the extra supplemental features.

$26.95
Fox
www.donniedarko.com

Donnie Darko: The Director's Cut

This time-travel movie didn't garner much flow at the box office in 2001, but it's since become a cult classic on DVD. (It's not often a creepy giant bunny tells the protagonist the world will soon end.) This cut reinserts about 20 minutes of footage into the heavily edited theatrical release. There's not quite as much left to the imagination, but it makes it easier to wrap your heard around the philosophical concepts Donnie Darko encompasses. Sadly the DVD transfer that plagued the original DVD release returns, which is really our biggest disappointment with this two-disc.

$11
Saddle Creek
www.saddle-creek.com

Bright Eyes—"I'm Wide Awake, It's Morning"

We lucky Nebraskans have watched Conor Oberst grow up in the public eye since he hit Omaha stages at the tender age of 13. Now 25, Bright Eyes' driving force is exploding nationwide with the simultaneous release of the superb "I'm Wide Awake, It's Morning," and the less inviting, but equally as challenging, "Digital Ash in a Digital Urn." With the always-lovely Emmylou Harris onboard, "Wide Awake" is an instant classic.

$10
RCA
www.kingsofleon.com

Kings of Leon —"Aha Shake Heartbreak"

Dubbed by many as The Strokes of the South, Kings of Leon is three Tennessee brothers and a cousin fuzzing its way through 12 garage rock gems on "Aha Shake Heartbreak." The album twists with flavors of southern rock, punk, country, gospel, and a waltz or two. Look for the boys this spring opening for U2.

See the full reviews from A/V Corner at www.cpumag.com/cpuapr05/AYL

DVD Byte

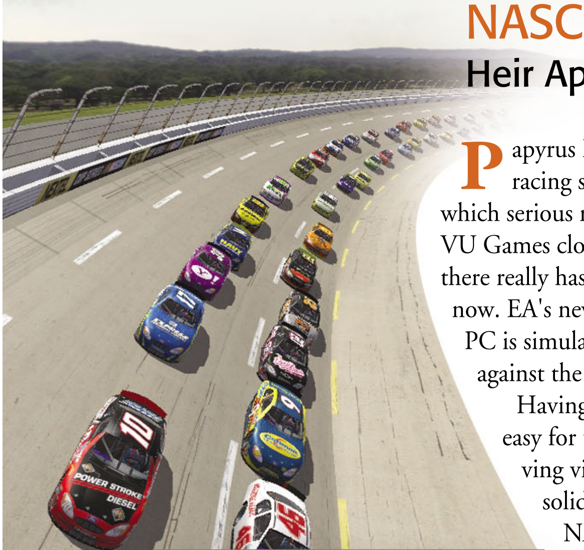
by Todd Doogan

THE DIGITAL BITS
we know dvd
www.thedigitalbits.com

Winter's almost over, so that means it's time for more DVDs. Too bad March hasn't got too much going for it. Let's take a look at the slim pick-in's. On the 1st look for Disney's **Bambi (Platinum Edition), The Brady Bunch: First Season**, the lame-o **Exorcist: The Beginning**, the action-packed remake of **Flight Of The Phoenix**, and **The SpongeBob Squarepants Movie**. There's nothing too fancy on the 8th except **Friends: The Complete Ninth Season**, a collector's edition of **Hoosiers**, and John Travolta in **Ladder 49**. The 15th is actually a lot better, even if it is a bit light. Look to bring **The Incredibles** into your home, as well as the remake of **Alfie**, a new version of **Star Trek: First Contact**, and Toby Hooper's **The Toolbox Murders**. On the 22nd, **Being Julia**, **Bridget Jones: The Edge Of Reason**, the live-action **Fat Albert**, Johnny Depp in **Finding Neverland**, MTV's **Pimp My Ride: The Complete First Season**, and Cartoon Network's hit micro-series **Star Wars: Clone Wars Volume 1** all street. Finally, on the 29th look for **After The Sunset**, **Closer (Superbit Edition)**, **The Toxic Avenger (Anniversary Edition)**, and the second season of **Twilight Zone: The Definitive Edition**. Not a great month, but not the worst either.

NASCAR SimRacing

Heir Apparent To The Late NASCAR Racing Series

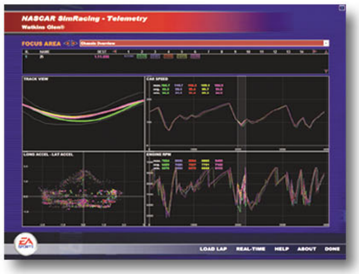


$39.99 (PC) • ESRB: (E)veryone

Electronic Arts
www.easports.com/games/nascarsimracing

Papyrus Racing Studios' market-cornering racing sims have been the benchmark by which serious racing games are judged. And, after VU Games closed the company down last May, there really hasn't been a serious contender. Until now. EA's newest NASCAR racing game for the PC is simulation-focused and steps straight up against the Papyrus legacy.

Having spent many hours on the track, it's easy for us to tell you that the gorgeous driving visuals, authentically detailed tracks, solid AI, and realistic gameplay push NASCAR SimRacing very close to pole position. The Career mode is the game's strength, but the laggy multiplayer not so much. This is a game all about physics, and things for the most part "feel right." It's not an arcade game, but the driving aids will help ease newbies onto the track.



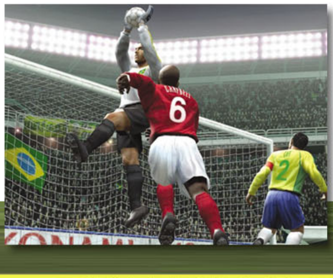
There's definitely room for improvement, but if EA follows through with as much dedication in it's follow-up effort, the NASCAR Racing series of old will be relegated to only fond memories. If you were a fan of the old, we recommend you free up hard drive space for the new. ▲

World Soccer Winning Eleven 8 International

Putting FIFA 2005 On The Defensive

$39.99 (Xbox, PS2); $29.99 (PC)
ESRB: (E)veryone

Konami
www.konami.com/gs/winningeleven



Winning Eleven 8 doesn't have the FIFA license, but you'll be able to recognize players such as Beckham and Ronaldo by their faces. The overall product lacks EA's spick-and-span polish and production. However, what Winning Eleven 8 *does* have in abundance is excellent player control and a true understanding of what it is to actually play soccer. In our December issue (page 94) we called EA's entrant the "most realistic footie controls ever" and are left eating crow because Konami's entrant (available on DVD-ROM for the PC for a paltry $29.99) handily outplays FIFA Soccer 2005.

It's hard not to gush about Winning Eleven 8. The game itself is the closest we've been to playing a real game (minus the kicks to the nether regions). The animations and visuals are spot-on, and the detail is good enough for you to spot fouls occurring from long range cameras. The one-on-one player vs. player game is superb because the in-game player control is without fault. Your teammates also act more believably on the pitch.

Winning Eleven 8 is a must have for anyone with a fondness for the world's favorite sports game. EA still commands in the realm of audio and production value, but comes in second to Winning Eleven 8. Play it and see for yourself. ▲

Star Wars Knights Of The Old Republic II: The Sith Lords'

Step Up If You Liked The Last One

We previously noted that KOTOR2 on Xbox (page 91, Feb. 2005) felt more like an expansion than a full-blown sequel. Everything we noted then, applies here. Still, KOTOR2 offers more of the superb gameplay value found in the original. The game starts tepidly, but improves substantially soon thereafter, so be sure to give it a little time. As we expected, the visuals do look quite a bit better than the Xbox version, but the graphics engine continues to look long in the tooth and is need of more than a superfluous update for the inevitable KOTOR3. It's worth your play time, but we question the high price. ▲

ESRB: (T)een • Nintendo

$49.95 * PC, Xbox
www.nintendo.com

Tenchu: Fatal Shadows

Quiet, Please

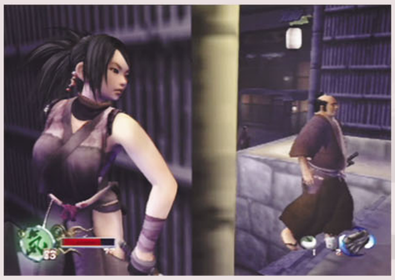
The Tenchu series debuted in 1998 on the PlayStation as Tenchu: Stealth Assassins, and there have been several iterations in the years since then, but the basic idea is still very much the same. You are a ninja in feudal Japan, and you must accomplish your goal—in this case, meting out justice to those responsible for razing a small village—using deadly stealth.

Fatal Shadows puts you in the role of two female ninjas, Ayame and Rin. Both characters can perform a satisfying range of moves; you can have them run, swim, jump, grab ledges or rooftops and climb, swing to higher vantage points using a grappling hook, double-jump, hug walls for stealthy movement, and more.

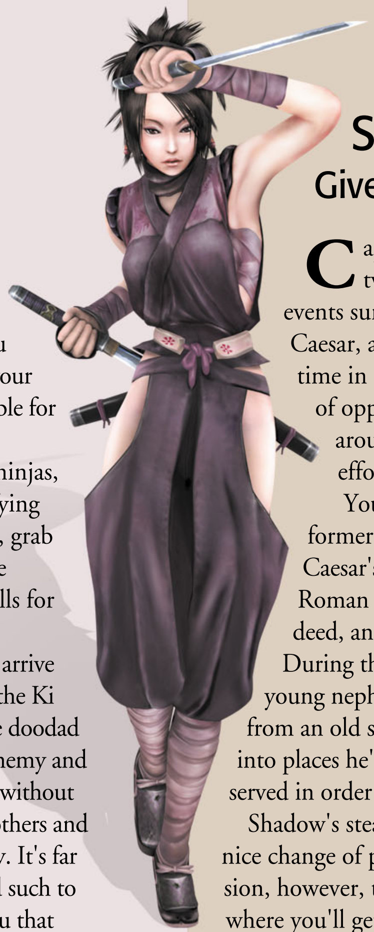
Both characters are also at their deadliest when they arrive unannounced, so you'll want to pay close attention to the Ki Meter in the lower-left portion of the screen. This little doodad keeps you apprised of your distance from the nearest enemy and how aware of you he may be. You can engage enemies without the element of surprise, but in some cases they'll alert others and gang up on you, and things can go south pretty quickly. It's far better to use the cover of buildings, trees, shadows, and such to creep up on your foes until the stealth-kill light tells you that you're clear to perform one of several fatal attacks that don't give the bad guys a chance to respond.

The game seems a bit dated in some respects; it doesn't have the razor-sharp control you'd expect from a modern 3D action game (especially one that relies on stealthy precision), and enemy AI is fairly primitive. But the game scores high marks for presentation (we especially enjoyed the TV serial-esque intros to each level), and we love the open-ended nature of most of its levels. (You can take out every enemy in a level, or you can sneak past some, and you can nearly always choose your path from several that are available.) In other words, Tenchu: Fatal Shadows doesn't reinvent the wheel where stealth action is concerned, but it manages to keep the wheel rolling along nicely. ▲

ESRB: (M)ature • Sega
$49.99 * PS2
www.sega.com/gamesite/tenchu



Ayame's getting ready to set this guy straight.



Shadow Of Rome

Give The People What They Want

Capcom's recent PS2 game, Shadow Of Rome, is really two games in one. The game is a retelling of the events surrounding the death of Roman emperor Julius Caesar, and as the story unfolds, you'll spend part of your time in the arena slicing and dicing your way through a sea of opponents. You'll spend the rest of the time sneaking around Rome, spying on senators and conspirators in an effort to solve the mystery of Caesar's death.

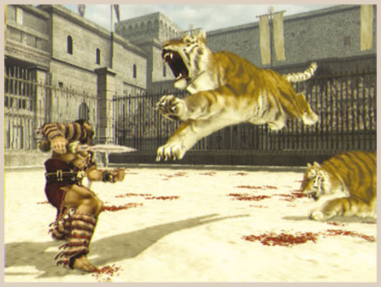
You play the arena portions of the game as Agrippa, a former centurion fighting to win the right to execute Caesar's killer. Well, sort of; Cicero, the leader of the Roman Senate, has accused Agrippa's father of the grisly deed, and as Agrippa you fight for a chance to save your dad. During the sneaking-around parts you'll play as Octavianus, a young nephew of the late ruler and friend to Agrippa. With help from an old spy and family friend, Octavianus learns how to get into places he's not supposed to go and how to move about unobserved in order to prove Agrippa's father's innocence.

Shadow's stealth missions are often quite fun and they provide a nice change of pace from the action-packed battle scenes. On occasion, however, they can turn into frustrating trial-and-error sessions where you'll get caught where you shouldn't be and have to start over at a particular checkpoint repeatedly.

The arena battles, however, are right on. Agrippa can use a wide variety of weapons and attacks and will face all manner of enemies, but the thing that sets Shadow apart from similar titles is the Salvo system. If you keep the audience entertained, you earn Salvo points and can obtain additional weapons and health power-ups from the crowd. This is important because you often face some pretty grim odds. It also changes the way you'll need to play to be successful.

The frantic yet strategic nature of its combat levels blends well with a dash of stealth and an interesting story to make Shadow Of Rome the best gladiator-themed game on any console we've seen to date. ▲

ESRB: (M)ature • Capcom
$49.99 * PS2
capcom.com/shadow



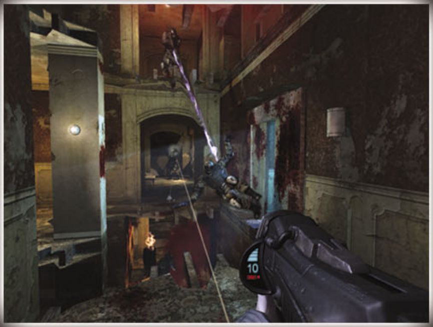
Most of your opponents in the arena will be human, but not all of 'em. Nice kitty!

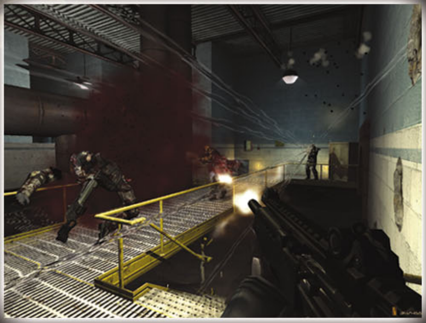
Hot Shots: The Beauty of the Game

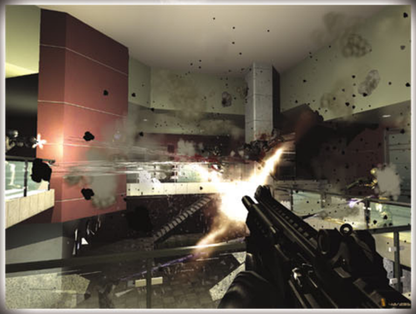
Yeah, we know it's all about the gameplay. Sure, there are those who would have you believe graphics are relatively unimportant in the greater scope of things, but if you read *CPU* mag, you probably already know those folks are off their collective rockers. We want great gameplay combined with stunning graphics, and here are two upcoming games that show promise. Watch for them.

F. E. A. R.

(PC-CD). With Half-Life 2 and Doom 3 already out, what's there to look forward to? This is one highlight we're expecting from Sierra this summer (www.sierra.com).

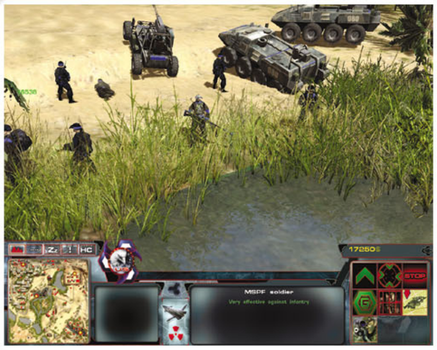


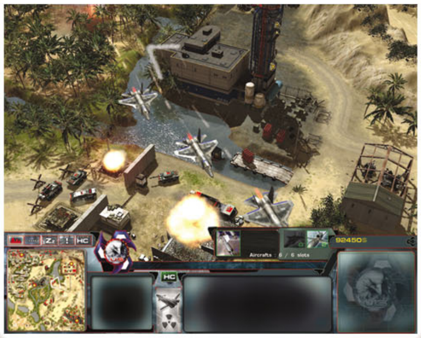


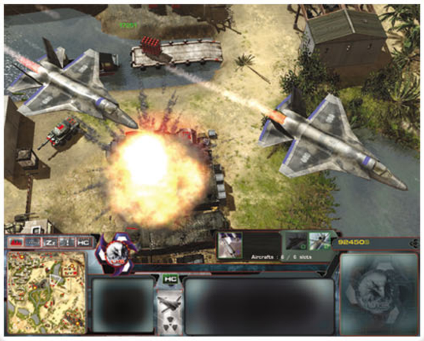


ACT OF WAR

(PC-CD). Expect this RTS based on the C&C: General engine to be out as you read this. We've played a prerelease and initial impressions are good. Head over to www.atari.com/actofwar for more info.







SOFTWARE TIPS & PROJECTS

Your Anti-tweaker Toolkit

WinXP Tip Of The Month

Even many Windows novices know that the CTRL-ALT-DEL combo brings up the Task Manager. But what if you have the all-important coffee cup in one hand and can't activate this two-handed bit of keyboard gymnastics? Right-click your Taskbar to find a shortcut to Task Manager. ▲

PC nuts like us often become the unofficial IT person for co-workers, friends, and family. If you're the unofficial IT person, then surely you have run up against the amateur tweaker. If you want to stop a tweaker, here is a collection of Registry edits that will lock tweakers out of their usual haunts. Our anti-tweaker toolkit is a great way to remain master of your PC domain.

Keep in mind that most of the Registry settings will apply to the user identity that is logged on, so apply the changes to the machine when logged on as the tweaker. Also, most of these Registry adjustments require a reboot to take effect.

Your Default Position

You can undo most of the Registry changes you're going to make by deleting the new keys. Nevertheless, protect yourself from problems by backing up the original setting for the Registry Keys you'll edit. To do this, create a new folder on your hard drive and name it something like AntiTweakDefaultKeys. Before you make each change in Regedit, highlight the key you want to alter and use the Export command in the file menu. In the Export Registry file window, navigate to your new folder and give the file a descriptive name. For instance, for the first tip, you can export the original HKEY_CURRENT_USER\CONTROLPANEL Key as ControlPanelAppDefault.reg. Click the Save button to save the original state of this key to your new folder. This will give you a collection of default positions you can restore later. To perform the restore, open Regedit, use the file menu to click Import, find and highlight the appropriate REG backup file, and click Open.

Control The Control Panel

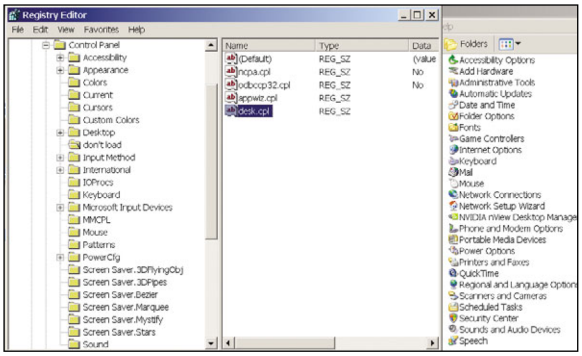
Most amateur techies know to go to the Windows Control Panel to adjust most of the major system, appearance, and connection settings on their PC. But what if your tweaker arrives at the Control Panel to find none of the familiar applets present? It means that you hacked the Registry to prevent specific Control Panel items from loading.

Right-click HKEY_CURRENT_USER\CONTROL PANEL and select New and Key to add a key named Don't Load. You'll create String Values from this key that won't let individual applets (with a *.cpl file suffix) load. For instance, right-click the Don't Load key, select New, String Value, and name the Value appwiz.cpl, which is the applet for the Add Or Remove Programs tool. Click OK, and the applet won't appear next time you open Control Panel. Create new String Values for each of the major applets you want to suppress. Here are some examples:

- Display properties = desk.cpl
- System properties = sysdm.cpl
- Mouse properties = main.cpl
- Sound and audio properties = mmsys.cpl
- Internet properties = Inetcpl.cpl
- Phone and modem options = telephon.cpl
- User accounts = nusrmgr.cpl

To reinstate these apps, delete the related String Value, or delete the Don't Load key to restore all of the default programs. Also, keep in mind that with these apps disabled in the Control Panel, *you* can still access the program by typing the full file name in the Run command box.

Also, to suppress the Control Panel. Go to HKEY_CURRENT_USER\SOFTWARE\MICROSOFT\WINDOWS\CURRENTVERSION\POLICIES\EXPLORER, create a new DWORD Value named NoControlPanel, and set its Value Data to 1. This will make the Control Panel disappear from the Start menu and any task panels in Explorer.



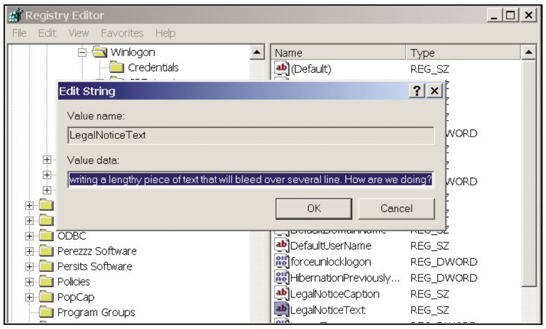
Name	Type	Data
(Default)	REG_SZ	(value
ncpa.cpl	REG_SZ	No
odbccp32.cpl	REG_SZ	No
appwiz.cpl	REG_SZ	
desk.cpl	REG_SZ	

You can order the Registry to suppress most Control Panel applets from loading.

End Run

IT wannabes may use the Run command box to load system control modules, such as the Control Panel apps you just eliminated, or load the System Configuration Utility, but you can block these actions by eliminating the Run box from the Start menu. Go to HKEY_CURRENT_USER\SOFTWARE\MICROSOFT\WINDOWS\CURRENTVERSION\POLICIES\EXPLORER, make a new DWORD Value named NoRun, and set its Value Data to 1.

Keep in mind that eliminating the Run box also prevents *you* from loading programs such as Regedit. This is why we reminded you to make those REG Key backups earlier. If you do lock yourself out of the Run command, remember that Regedit.exe resides in your Windows folder; launch it directly from there.



Value name: LegalNoticeText

Value data: writing a lengthy piece of text that will bleed over several line. How are we doing?

Name	Type
(Default)	REG_SZ
DefaultUserName	REG_SZ
forceunlocklogon	REG_DWORD
HibernationPreviously...	REG_DWORD
LegalNoticeCaption	REG_SZ
LegalNoticeText	REG_SZ

You can create a custom window that greets users with any important reminder.

Keep Associations

Some users add new software to a PC to run MP3 or image files with their media players. To prevent them from trying to change the system's file association go to HKEY_CURRENT_USER\SOFTWARE\MICROSOFT\WINDOWS\CURRENTVERSION\POLICIES\EXPLORER. Add a DWORD Value NoFileAssociate and set the Value Data to 1. This will blank out the option to change file associations throughout the Explorer interface. Users could start an individual file type manually with a nonassigned program, but they can't change the association permanently in the system.

Lock The Desktop

To help lock down the look and feel of a Windows Desktop, cut tweakers off from their most likely route: right-clicking the Desktop to rearrange icons, creating new folders, or accessing Display Properties. In the Registry go to HKEY_CURRENT_USER\SOFTWARE\MICROSOFT\WINDOWS\CURRENTVERSION\POLICIES\EXPLORER. Right-click the Explorer Key, create a new DWORD Value named NoViewContextMenu, and assign a Value Data of 1 to suppress the context menu on the Desktop.

Keep in mind that this change prevents the user from accessing a context menu in other Explorer operations (right-clicking a drive or file in an Explorer window). Depending how you want to limit user behavior, this could be a good or a bad thing.

If you want to keep the Desktop clear of icons entirely and prevent others from cluttering it with new shortcuts, go to HKEY_CURRENT_USER\SOFTWARE\MICROSOFT\WINDOWS\CURRENTVERSION\POLICIES\EXPLORER, create a new DWORD Value named NoDesktop, and set the Value Data to 1. This will remove all icons from the Desktop and reject new ones. Also, the tweak disables the context menu. This is the total Desktop-lockdown solution.

On the other hand, if you want to split the difference between the previous two tweaks, you can hide all Desktop icons but keep the context menu by going to HKEY_CURRENT_USER\SOFTWARE\MICROSOFT\WINDOWS\CURRENTVERSION\EXPLORER\ADVANCED. Take note that this is not the same key we've been using to make changes in the Explorer interface. Make a new DWORD Value named HideIcons and give it a Value Data of 1.

Lock The Taskbar

Users can do a lot of mischief by right-clicking the Taskbar or Start menu and tweaking the interface, adjusting what does or doesn't show up in the start box or System Tray, etc. To disable the context menu on both areas of the Taskbar, go to HKEY_CURRENT_USER\SOFTWARE\MICROSOFT\WINDOWS\CURRENTVERSION\POLICIES\EXPLORER. Create a new DWORD Value named NoTrayContextMenu and give it a Value Data of 1.

Clear The Docs

When multiple people are using a PC under a single-user account, you can prevent anyone from seeing someone else's recent work by clearing the Recent Documents folder at shutdown. Go to HKEY_CURRENT_USER\SOFTWARE\MICROSOFT\WINDOWS\CURRENTVERSION\POLICIES\EXPLORER, create a New DWORD Value titled ClearRecentDocsOnExit, and give it a Value Data of 1. The Recent Documents folder will come up empty when the machine is restarted.

Just A Reminder

If you want to remind a user about company (or family) policies or offer a greeting, then add a bootup message that will flash in its own window every time Windows XP starts. At the HKEY_LOCAL_MACHINE\SOFTWARE\MICROSOFT\WINDOWSNT\CURRENTVERSION\WINLOGON Key, open the Value for LegalNoticeCaption. With most systems that don't have a boot notice, the Value Name will be blank. Any text you enter in the Value Name field will become the title bar for the bootup window.

The next Value should be LegalNoticeText, which is where you type a text message into the Value Name box that you want to appear in the window at boot up. The field is a single line, but keep typing a full paragraph of text past the space provided. Also, you can write more text with Notepad and simply copy and paste it into this field. At the next reboot, the message will appear before the Desktop loads.

by Steve Smith

Infinite Loop

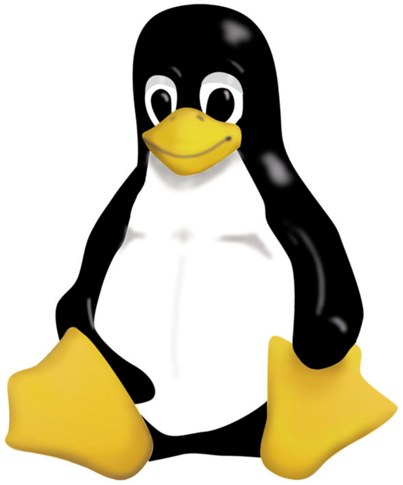
Bug Off

Well, at least Australia's good for something besides poisonous snakes. If you're sick of handing over your personal information to random Web sites just so any advertisers' whim, then you should look into BugMeNot.com. The site, created by an Australian native, spawns generic login names and passwords to be used on any number of nosy sites.

The site's been around awhile and gets about 10,000 hits a day. Check it out to avoid future bugging. ▲

Source: http://www.wired.com/news/infostructure/0,1377,64270,00.html

WARM UP TO PENGUINS



Playing Windows Games Under Linux With Cedega

All work and no play will make even the hardiest working among us twitch from time to time with the need to kick back and relax, or pump up the adrenaline, depending on your preference. Although there are many games available to play natively under Linux (see the Linux Gamer's Game List, www.icculus.org/lgfaq/gamelist.php), all too many games still aren't supported.

The WINE project (www.winehq.org), which provides the ability to run some Windows 98 and older programs under Linux, can address some of the older games you have lying around, but TransGaming Technologies (www.transgaming.com) offers the commercial product Cedega (formerly known as WineX; now in version 4.2.1), which brings DirectX functionality to the Linux desktop for select games.

Get & Install Cedega

You can either purchase a subscription to Cedega—which gets you the software in handy package formats, such as RPMs—or you can download the source code and build it yourself. For this article we will be using the paid version, which is $5 per month. It is recommended that before you pay for a subscription, you go to transgaming.org/gamesdb first and find the particular game(s) you want to play. Although Cedega supports a select number of games at various levels of functionality, it doesn't support all Windows games. Keep watching the site, however, because support may become available in time.

To purchase a subscription, point your Web browser to the TransGaming Web site and sign up as a TransGamer. Once you have paid for the subscription, log into your TransGamer account and click the Downloads button. From there, click the Most Recent Pre-Packaged Files link. Read the software license agreement page, and after you agree to the license, you will be sent to the Downloads area.

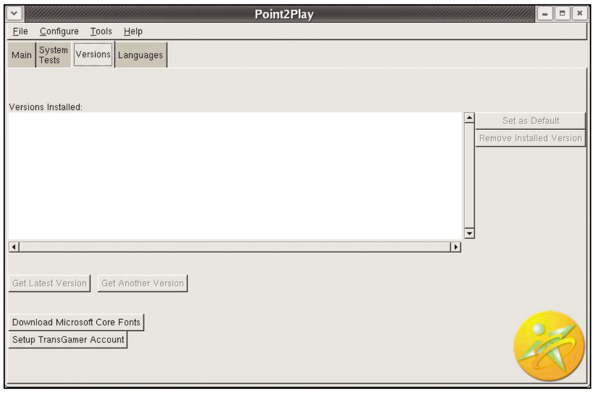


Figure 1: You'll be able to run tests and more in the Point2Play installation and management program.

New 2.6 Kernel ATI Driver Available

It seems that some of us Linux users will have to stop bagging on ATI so hard now. The company has caught up and now has new 2.6 video drivers for Linux ready to use. Go to www.ati.com/support/drivers/linux/radeon-linux.html for release notes and the download. ▲

The files that you will want to download are Cedega, Point2Play (1.3.2 is the latest version), and the Mozilla X Installer in the format that's most appropriate for your particular distribution. You may want to leave this download page open because it contains a number of help files (ending in a .txt file extension) that you might find useful later on. Next, install the programs using your distribution's package manager. For example, in an RPM-based distribution, you might type:

```
rpm -Uvh Point2Play-2.3.2-1.i386.rpm cedega-5.2.1-1.i386.rpm transgaming-mozctlinstaller-2.0-1.i386.rpm
```

Set Up Point2Play

Once you have all the Cedega components installed, take a moment to read the text documents in the Downloads area of the site. At the least, skim through these because there may be comments specific to the version of Linux you are using. There may also be hints of what to do if you encounter certain problems. When you are ready to proceed, start the Point2Play program by either selecting it in your menu (there may even be a new TransGaming menu in your listing) or by typing **Point2Play** at a command prompt. The Point2Play client will appear and look something like what is shown in Figure 1.

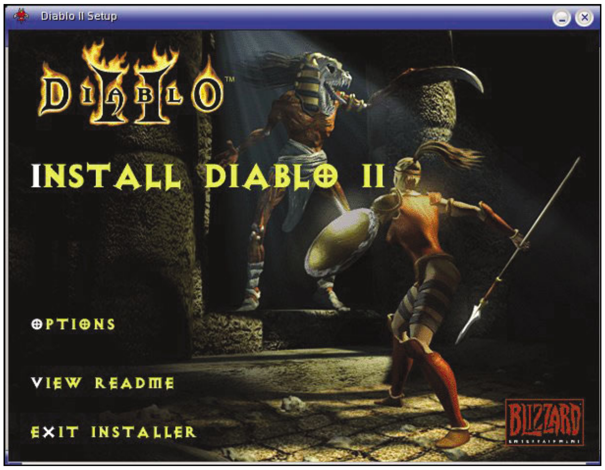


Figure 2: Diablo II's installation screen, as shown in a Cedega window.

Start by clicking the System Tests tab. You'll find four tests available in this tab. Clicking the name of a test will show you what the test is looking for specifically and will provide you a button to run the test. It's a good idea to walk through these one by one, running the tests and observing the results. If you encounter a problem, there are hints in the Point2Play Howto Guide on how to deal with various problems. In addition, there are also discussion forums available at the TransGaming Web site that you can access if you are having trouble finding what's wrong. Most of the tests are short, and the tests that check your 3D graphics will pop up a dialog box that shows animated moving gears. These tests are geared toward determining how fast your graphics components are and more.

When you're finished dealing with the tests, click the Versions tab. Click the Download Microsoft Core Fonts button, read the license agreement, accept it, and wait while Point2Play downloads what it needs. When it is done, an Information dialog box will appear to indicate that the download is complete. Click OK to close the box.

Next, click the Setup TransGamer Account button. Fill in your TransGamer username and password. If you need to use a Web proxy, check the HTTP Proxy checkbox and then fill in the appropriate information. Click Continue when you are ready to proceed. You will be returned to the main Point2Play window. If you didn't install Cedega from a separate package, click the Get Latest Version button. This will download Cedega and install it for you. If you have already installed Cedega from a RPM, you won't need to do this step.

Install A Windows Game

Again, before you try to install a game for Cedega, be sure to go to the TransGaming Web site and click the Games tab to look up how well the game you want actually performs under Cedega and if there are any glitches that you need to worry about. If the game looks like it is worth trying (and we figure even if there's only a slim chance, it's worth the effort), place the game's installation CD into your CD-ROM drive and click Install. The Install A Program dialog box should appear.

In the Path To Installer Executable dialog box, click Browse. This will display your CD. Look for Install.exe or Setup.exe files. Sometimes, both files will be present. If this is the case, try one. If it doesn't work, try the other file. In the Program Title line, enter the name of the game and ignore the Cedega Version To Use option for now. You might need it later, however, if you have older and newer versions available and certain older versions turn out to handle your favorite game better than new ones.

Click Continue when you are ready to move on. If nothing happens or an error occurs, see the Point2Play documentation and the TransGaming forums. There are newer and older forums, so if you don't find an answer to your question(s) on the new forums, search the older ones, and you may find something there. The Cedega HowTo Guide can also be quite useful if you run into problems. (Fedora Core users in particular will want to read this document.)

If all goes well, you should be able to walk through the game's installation (as shown in Figure 2) just as you would a Windows installation. In our experience, we have learned that if Point2Play doesn't play nicely, ignore it and use your command line. (Change directories to the CD-ROM directory and type **cedega ./install.exe** or **cedega ./setup.exe**, whichever is appropriate.) Once the game is installed, you can then return to Point2Play's Main tab, select the installed game in the listing, and click the Play button to launch the game.

Get Your Linux Gameplay On

The better Cedega supports your game, the better gameplay will be. Cross your fingers and then dive into your cross-platform gaming adventure. The fun part is pulling out your older games and seeing how they will perform here, as well.

by Dee-Ann LeBlanc

Infinite Loop

Silk Stitches

Nearly 40% of Americans have an extreme fear of a situation or object. A recent study by David Knight and his team at the University of Oxford combines two common fears, needles and spiders, in another scary situation: having surgery. Spider silk is known for its elasticity and strength, and Knight and his colleagues have shown that it may work for surgical stitches.

The researchers exposed single threads to temperatures between -60 degrees Celsius (-76 degrees Fahrenheit) and 150 C (302 F). The fibers withstood the temperature changes and stretched at least 20% before breaking. As the temperature rose above 150 C, the silks weakened, but they did not break down until 370 C (698 F), proving that the fibers could withstand heat sterilization before threading the surgeon's needle. Now, if only to conquer that pesky fear of dying on the operating table. . . . ▲

Sources: www.newscientist.com
www.infoplease.com
health.discovery.com

Home Automation for Real People

With Control4, you can finally stop using "home automation" and "when I win the lottery" in the same sentence. That's because we offer a more practical approach for automating and simplifying all the different technology in your home—from lighting, temperature, and security systems to sophisticated home theater centers. Every Control4 solution is easy to install in new or existing homes, a pleasure to use, and surprisingly affordable. So visit our Web site to find an authorized Control4 dealer near you. And discover exactly how easy and inexpensive home automation can be.

www.control4.com • 1-888-400-4070

Control4®

©2004 Control4 Corporation. Control4 and the Control4 logo are registered trademarks of Control4 Corporation.

Intel Pushes Full Speed Ahead Button

by Mike Magee

What a difference a month or two makes in the absolutely action-packed CPU business. As I write this, Intel is about to release its 600 series Pentium 4s and has already told its partners in secret documents about the 800 series dual-core processors which it expects to release between now and the end of June.

The 800 series dual-core processors, which were formerly code-named "Smithfield," come enabled as 32/64-bit microprocessors, with each of the cores having 2MB of level two cache. The chips are numbered as 840, 830, and 820—Intel's reasons for attaching these digits to its chips are rather unclear, but they correspond respectively to clock speeds of 3.2GHz, 3GHz, and 2.8GHz. Everyone is pretty confident that Microsoft Windows Pro 64 will be released in the first half of this year, so the processors will be able to take advantage of the additional memory features offered by the OS. The processors will also support the XD (Execute Disable) buffer overflow bit, and Intel's enhanced SpeedStep which regulates the clock speed so that not too much heat is generated. They will also fit in the LGA775 socket and will be manufactured using Intel's 90nm process technology. Interestingly, each of the two cores don't support Hyper-Threading, so you won't be looking at a machine which effectively has four cores. (Well, not yet, anyway.)

The new processors will come with 855X Express and 945 Express chipsets, supporting 8GB of dual-channel DDR2 memory at 667/533MHz, and the option of 1,066MHz and 800MHz system buses. The CPUs will also be very cheap, with prices we've seen of $525, $315, and $240, respectively. This is very aggressive, and it's clear that Intel wants to give AMD another lesson in price war technology. I think it will start a general price slide, and no doubt Intel wants to give AMD a lesson it won't forget.

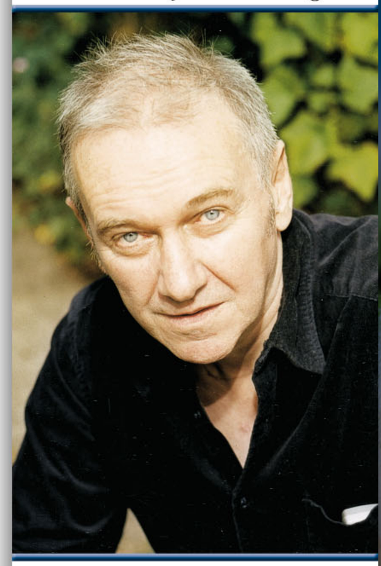
But it's that 90nm technology that I'd like to return to. Intel is the processmeister amongst all the semiconductor companies, and reliable sources inside Intel tell me that it already has the next generation process, chips made using 65nm technology, up and running. Not just for desktop processors, but for notebook and server chips, too. This indicates to me that an internal restructuring at Intel, probably masterminded by the future chief executive officer Paul Otellini, is working.

The most recent Intel roadmaps I've seen bear out the 65nm conclusion. By the first quarter of 2006, Intel will be ready to introduce its "Presler" core.

So where does that leave us? This year there will be Intel processors in the 600 series with the highest clock speed at 3.80GHz, and the others clocking at 3.60GHz, 3.40GHz, 3.20GHz, and at 3GHz. These all have 2MB level two caches, all support 32/64 bits, the XD bit, and Hyper-Threading. But the 500 series will still be sold for most of the year, except Intel will gradually enable them for 32/64-bit operation too. How the heck do you decide which is best for you? I wish I could give a simple answer to this question, but to some extent we're at the mercy of the chip manufacturers who are likely to give us what they want. It's all jolly confusing, in my opinion.

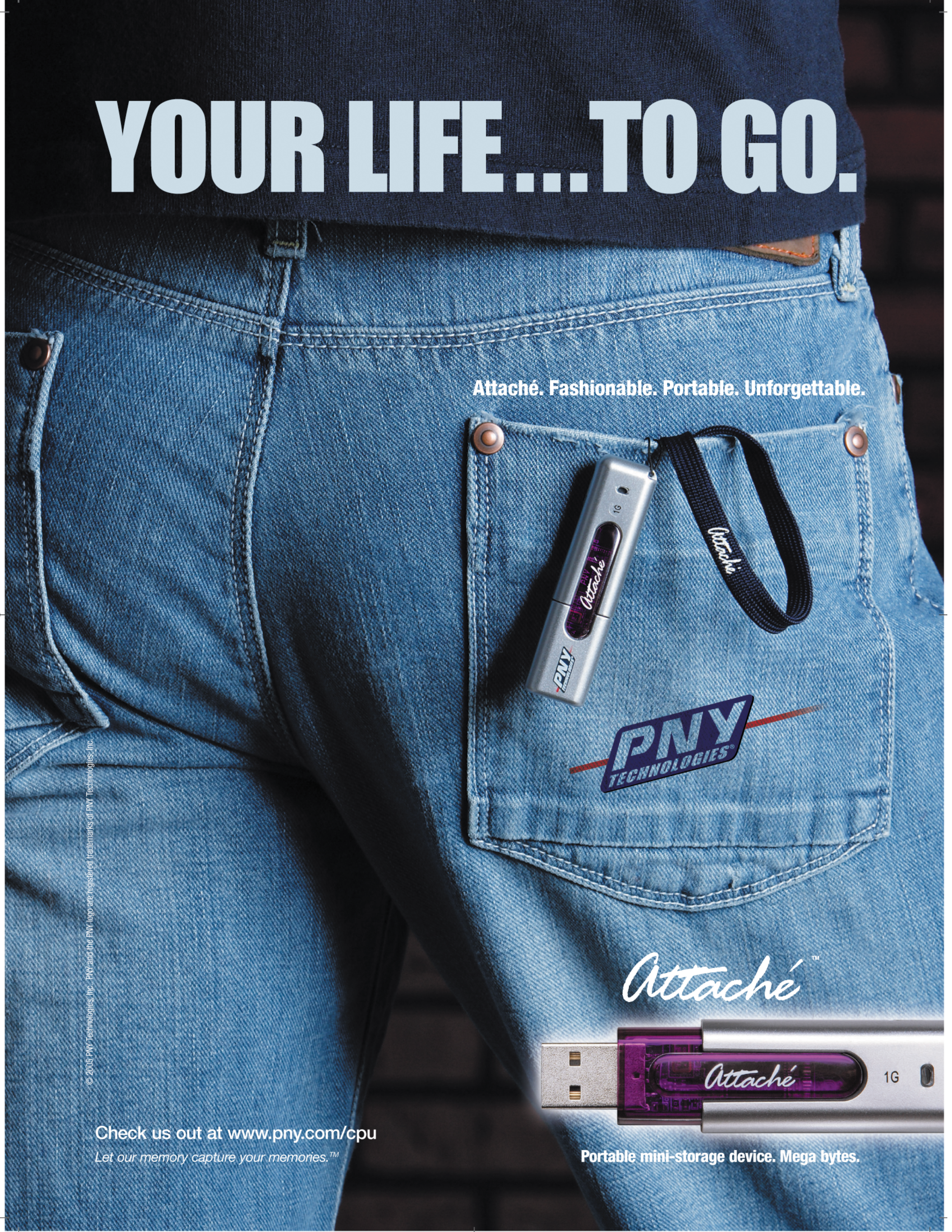
I'm still rather unclear, despite repeated briefings from Intel and AMD, what benefits the dual-core technology is supposed to bring to the party, or to you or me. Intel appears to want to bury the whole concept of clock speed, but having spent years building that up as the be all and end all of PC performance, it's hard to keep the corpse 6 feet under. We all still want performance from our machines and don't really care how we get it. The answer is probably software applications and underlying software that works behind the scenes that do really clever things with the dual or multiple cores. But software development has been in the doldrums for years, and no one ever talks about killer applications anymore. The killer apps used to be in those bulky packages with volumes of manuals that would probably grievously hurt you if they fell off a shelf onto your head. ▲

Send rumours to "Mad Mike" Magee at Mike@cpumag.com.



Mike Magee is an industry veteran. He cut his teeth on ancient products like the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. He has contacts from top to bottom in the business, spanning the entire chain, who help him root out interesting rumours and speculation.

. . . . Intel wants to give AMD a lesson it won't forget.


YOUR LIFE...TO GO.
Attaché. Fashionable. Portable. Unforgettable.
1G
PNY
Attaché
Attaché
PNY TECHNOLOGIES®
Attaché™
Attaché
1G
Check us out at www.pny.com/cpu
Let our memory capture your memories.™
Portable mini-storage device. Mega bytes.

© 2005 PNY Technologies, Inc. PNY and the PNY logo are registered trademarks of PNY Technologies, Inc.

Technically Speaking

An Interview With Barbara Mikkelson, Your Urban Legend Tour Guide

The Internet seems to offer as many tall tales as it does facts. Whether it is fallacious Photoshop images, get-rich-quick chain mails, or stories meant to scare or inspire, the Internet can prove P.T. Barnum's assertion: There's a sucker born every minute. (Oh, wait. Barnum may not have said that. Sites such as www.historybuff.com/library/refbarnum.html point to a fascinating counter-story.)

Those who don't want to be suckers turn to Snopes.com. Started in 1995, Snopes.com is a labor of love run and written by husband and wife team David and Barbara Mikkelson. The site is the Internet's largest archive of urban legends and the true stories behind them. Barbara Mikkelson sat down with us to talk about the site, the stories it contains, and why people remain so devoted to believing them. ▲

This rare video grab, captured from the surveillance archives at Disney World, shows Barbara and David Mikkelson, owners of prominent urban legend Web site Snopes.com, undergoing some insidious form of matter scattering.

by William Van Winkle

CPU: Is there something in your background that makes you question everything?

Mikkelson: Oh, I'm as gullible as they get.

CPU: Come on.

Mikkelson: Yeah! I grew up believing a number of urban legends and had never realized that they could be anything other than true stories; until I ran into my first collection of urban legends and started reading along. As I did, I discovered that a number of the tales I had heard years ago and believed were nothing more than just common, repeated lore. A lot of people have that reaction, apparently.

CPU: What debunked story hit you the hardest?

Mikkelson: It was actually a newsgroup that I was reading where I found a number of these things. One of the stories I'd heard was one of the very first variations of the 'AIDS Mary' tale. In this case, a fellow that I played cards with was telling me about the experience of his friend's daughter who had come back from Mexico. She had met a young man on vacation down there, and they had had a wonderful time. He was madly in love with her, and he was going to come and live in Canada as soon as he could arrange the travel. But he gave her a little gift to take with her on the plane, as she went back from her vacation, and he told her she couldn't unwrap it until she was on the plane. When she got on the plane and unwrapped the thing, she found it was a coffee cup and emblazoned on it was, 'Welcome to the world of AIDS.'

CPU: That turned out to be false?

Mikkelson: Exactly. I went through years of thinking about that poor girl who caught HIV, who'd been deliberately infected by someone who was out to revenge himself on rich tourists or whatever—and only to find out this was just a traveled piece of lore.

CPU: Everybody pursues their own thing because it matters to them. Yours seems to be uncovering the truth about stories. Why do you feel compelled to go out of your way to do this?

Mikkelson: It's fun. It's really neat to go and dig up something that was new or wasn't previously known about something. There's a great sense of accomplishment that attaches to that. And for David and me, we always have stuff to talk about, always have things to work on. There's always interesting conversation in the car. We have a job that is just constantly changing and evolving, and everything is different day-to-day.

CPU: How did the site get started?

Mikkelson: Basically, just by David and myself thinking we should start putting up some of our writings and our findings as Web pages. The Web was something new and developing, and David in particular thought he could put up a few of them as pages and see how that went.

CPU: Did you start getting traffic right away?

Mikkelson: We did. And it was most gratifying. The responses were always positive, and then trying to run the site was running into the household budget. That's when we first started carrying advertising on the site because it got to the point where it wasn't just eating into the household budget, but we couldn't actually support it otherwise.

CPU: Can you generalize about whether there is a point to urban legends? Do they serve a purpose?

Mikkelson: They are often used to give voice to any number of anxieties or concerns people have. It's like, if you were feeling anxious about something in your world and along came this story that just perfectly illustrated exactly what you were feeling uneasy about, you would turn and share it with others because you would be able to say, 'See, see. This is exactly what I was saying. This is exactly what I've been feeling lately.' That's why these stories get spread as much as they do.

Another reason for them is that sometimes these stories are expressions of how we would run the world if we were in charge. Good people would be rewarded; bad people would be punished. It's a way of expressing a sense of unease with how things happen.

CPU: Just a few days ago, we received an email about all the outlandish fish that washed up off the bottom of the ocean following the Asian tsunami. Seemingly overnight, you were able to track down the source of those photos to some Australian deep-sea survey. How?

Mikkelson: That's David's tricks-of-the-trade. He's able to dig up sources on photos pretty well. It comes down to this: If a story has gotten out there, then the photos had to have been online somewhere. So the key is finding them, and chances are somebody out there knows where they came from. It's just basically knowing where to hunt and peck. I mean, you look at pictures of fish like that, you pretty much know it has to come from a fish-related place.

CPU: Do you ever come under fire from interest groups of whatever stripe for deflating what they would perceive as messages of hope, or being positive?

Mikkelson: From groups? Not really. From individuals? Yes. A lot of people will say something like, 'Well, what is the harm of passing along a perfectly innocuous feel-good story? If it teaches somebody to be good or if it passes along an important message, what's the harm in it?' And I keep answering the same way, 'There's a commandment against that.' I figure it's kind of important to God that you should be truthful. There was no exception. You don't bear false witness, except for when it's for a good cause or when there's no harm in it. And you also have to think: How much good are you teaching? How much help are you giving if you have to use a falsehood to accomplish it?

Top Tech Tales Debunked By Snopes.com

The iLoo was going to revolutionize relief. To help promote its MSN brand, Microsoft was working on a Web-enabled portable toilet equipped with a plasma screen, wireless keyboard, and even URL-imprinted toilet paper. The news broke around April Fools' Day 2003 from a U.K. branch of Microsoft; and even Microsoft's own PR company confirmed the iLoo story for news media. Unfortunately, the iLoo was little more than a headline-grabbing prank by the U.K. division: Although, whether there was tentative research into the iLoo going on at Microsoft before execs killed the idea is still open to conjecture.

Wouldn't it be great if you could curb your email spam by signing up for the National Do Not Email Registry, just like its phone-calling counterpart? All you have to do is go to ubsub.us and provide your email address. However, even the FTC (Federal Trade Commission) calls the list a scam. There is no government-backed antispam registry, and the site's owner information is hidden. Most likely, the site exists to collect email addresses for selling to spammers.

One thousand bucks from Bill Gates? Old Man Microsoft is hard at work testing a new email tracking system and he needs your help. Just forward this message to everyone you know, and when the forwarding chain hits 1,000 people, each will get $1,000. Of course, there's no such thing as an email tracking system (yet), and the idea of Bill Gates paying non-Microsoft employees to test software is absurd. This urban legend evolved several times since its 1997 debut, gaining apparent credibility and complexity at each step, but nothing changes the fact that it's utter hogwash. Despite this, Barbara Mikkelson says Snopes.com still receives five to 10 emails each day asking if the offer is true.

"Oh, I'm as gullible as they get."

—Barbara Mikkelson

Subscribers can read bonus content with Barbara Mikkelson at
www.cpumag.com/cpuapr05/mikkelson.

What's Everyone Talking About?

ComputerPowerUser.com

Take Advantage Of All The Extra Benefits Of Being A Paid Subscriber Today!

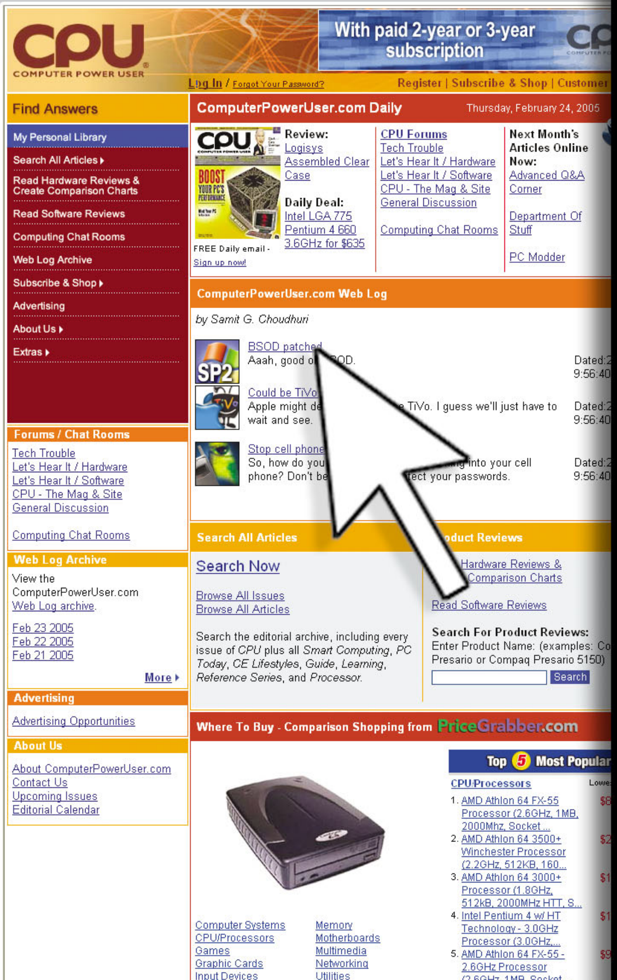
Here's what's available to everyone:

- The CPU Web Log. Each weekday, our editors scour the Web to bring you the best high-tech (and occasionally offbeat) information in an entertaining way.
- Forums to share (or show off) your thoughts and expertise. Great whether you know it all or want to know more.

Subscriber Tip Of The Month

Can't Wait for Next Month's Issue?

As a subscriber to CPU, we give you a peek at articles we're working on for next month in the Next Month's Articles Online Now section. You'll see the Next Month's section at the top of the CPU.com home page, next to the daily information. Be sure to log in before clicking the link to read the full article.



View the ComputerPowerUser.com Web Log archive.

by Samit G. Choudhuri

BSOD patched
Aaah, good o OD.
Dated:2
9:56:40

Could be TiVo
Apple might de e TiVo. I guess we'll just have to wait and see.
Dated:2
9:56:40

Stop cell phone
So, how do you into your cell phone? Don't be tect your passwords.
Dated:2
9:56:40

Search the editorial archive, including every issue of *CPU* plus all *Smart Computing*, *PC Today*, *CE Lifestyles*, *Guide*, *Learning*, *Reference Series*, and *Processor*.

Enter Product Name: (examples: Co Presario or Compaq Presario 5150)

1. AMD Athlon 64 FX-55 Processor (2.6GHz, 1MB, 2000Mhz, Socket ...
2. AMD Athlon 64 3500+ Winchester Processor (2.2GHz, 512KB, 160...
3. AMD Athlon 64 3000+ Processor (1.8GHz, 512kB, 2000MHz HTT, S...
4. Intel Pentium 4 w/ HT Technology - 3.0GHz Processor (3.0GHz,...
5. AMD Athlon 64 FX-55 - 2.6GHz Processor

Only paid subscribers to *CPU* magazine get complete access to all these great features:

Latest Issues. Get a guided tour through the latest editions of our technology publications.

More hands-on hardware reviews. Are the latest products worthy of the marketing hype? We put products to the test, complete with comparison charts and links pointing to where you can buy the products online.

Even more great reading. Our Web site features every article from *CPU* and a searchable archive of more than 18,000 articles from our sister publications *Smart Computing*, *Learning Series*, *Guide Series*, and *Reference Series*. It's like getting five magazines for the price of one!

A showcase of articles from next month's issue. Impress your friends with all the insider information you get by reading *CPU*'s latest articles and product recommendations before they're available in print.

CPU
COMPUTER POWER USER

Under Development

A Peek At What's Brewing In The Laboratory

by William Van Winkle

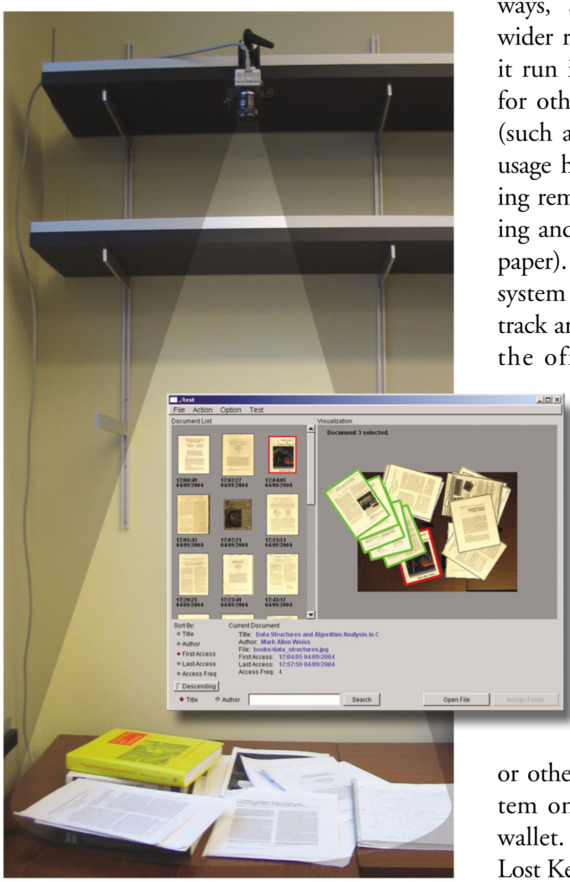
Where Papered & Paperless Meet

You may never have to utter "now where did I put that paper?" again if sixth-year grad student Jiwon Kim and others at the University of Washington find success with a video-based document-tracking system. Using special software and an overhead camera, users can identify individual documents with metadata and then track those docs as they move from pile-to-pile and place-to-place through an environment.

Although the user can start with a blank desktop, the system can alternatively begin with a snapshot of the environment's present pile layout and then fill in document details over time. Documents can be identified by keyword metadata, the time of their last movements, or their general appearances according to thumbnail representations. When you move a document from pile A to pile B, the system not only remembers this but also updates its known position within pile B every time a new document is placed on top of, or removed from, the pile. When the time comes to find a document, you find the right item through thumbnail or keyword searching; the UI highlights the right pile and shuffles out all that pile's documents with a green border, except for the one you want, which is bordered in red.

Kim says his teams now use a 1,600 x 1,200 camera to cover a desk area about 6 x 6 feet. He believes tracking items across multiple cameras and across locations, such as when you move a doc from work to home, will eventually be possible. "We are currently working on improving the current system in various ways," says Kim, "enabling it to handle a wider range of user interactions, making it run in real time, and adding support for other kinds of useful functionalities (such as grouping documents based on usage history or visual similarity, attaching reminders to documents, and detecting and recognizing written markups on paper). Our ultimate goal is to extend the system to the entire office and make it track and recognize all physical objects in the office, including nondocument objects on the desk."

Knowing that people tend to be better about sorting snapshots on a table than clicking photo files into folders, the team devised a sister application that could perform the folder organization operations when users sorted digital photo printouts under the camera's eye. Tracking could also be applied to books, discs, or other objects. Kim notes that the system once let him find his roommate's wallet. We're anxious for the Find My Lost Keys 1.0 patch upgrade. ▲



Document 3 selected.

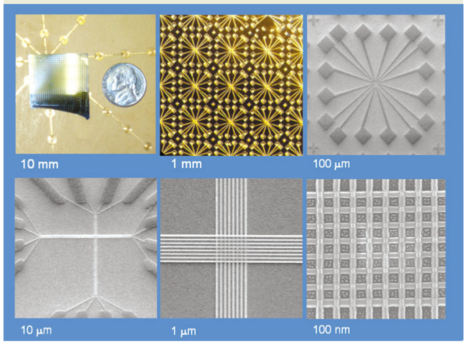
Current Document
Title: Data Structures and Algorithm Analysis in C
Author: Mark Allen Weiss
File: books/data_structures.jpg
First Access: 17:04:05 04/09/2004
Last Access: 17:57:59 04/09/2004
Access Freq: 4

Latching Onto The End Of Transistors

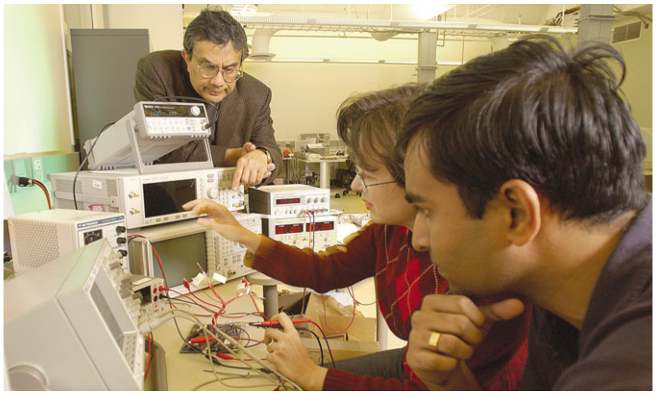
We all know that Moore's Law dictates the doubling of transistors on a CPU every few years, and that the Law is expected to fail within the next decade due to the physical limitations on cramming too many transistors together. But what if you could compute without transistors? That's the approach Stan Williams, Phil Kuekes, and Duncan Stewart at HP Labs are taking.

Their crossbar latch design involves trapping a layer of electrically switchable material a few atoms thick between crossed wires. With this, one can store a bit of data or perform a logic function. The team recently showed proof of the design by using it to perform NOT operations. Traditional computing designs require much larger three-terminal transistors to do this. The team has previously demonstrated the ability to perform AND and OR functions with nanoscale components fashioned chemically rather than through lithography. The crossbar latch completes the triad of logic functions necessary for nanoscale computing.

"Transistors will continue to be used for years to come with conventional silicon circuits," says Kuekes in a statement, "but this could very well replace transistors in computers someday, just as transistors replaced vacuum tubes and vacuum tubes replaced electromagnetic relays before them." ▲



Saving Energy With PBITs? Probably



In computing, at the chip level, noise and heat breed uncertainty. Moreover, the formation of transistors is an imperfect process, and at the nano-level, each one also is unique. The smaller the transistor, the more unpredictable its electrical behavior can be. This is one of the greatest challenges to Moore's Law. This is also why today's processors consume a great amounts of energy confirming their 0s and 1s at each computational step.

At the Georgia Tech College of Computing and the School of Electrical and Computer Engineering, Dr. Krishna Palem has devised the first chip that's based on Palem's own theory of PBITs (probability bits). As the school describes it, "A PBIT is like a conventional bit in that it takes on a 0 or a 1 value, except that one is certain of its value only with a probability of p." Fuzzy logic and probability applications (Google is an example) would be right at home with a PBIT processor because they're not striving for one definitive answer, only a range of most likely answers.

"Our PBITs model is now backed by measurements of an actual probabilistic CMOS device, which we call PCMOS," says Palem in a Georgia Tech statement. "Our device takes advantage of noise at the quarter-micron (0.25-micron) level and uses probability to extract great energy savings. Noise and energy savings are becoming increasingly important as semiconductors approach the nanoscale."

Google is proof of the well-known fact that the more probability is favored over certainty in computations, the faster those operations can go. Yet Palem is out to save energy, not boost MIPS (million instructions per second). He estimates that chips based on PBIT processing will realize an average 20% energy savings, although this could be much higher depending on the application. Early PBIT work that Palem did in 2004 with voice recognition compressed power usage by a factor of 1,000. This has led researchers to speculate about cell phones that run for weeks on one charge, rather than days. The Georgia Tech research is funded by DARPA and is also being closely watched by Intel. ▲

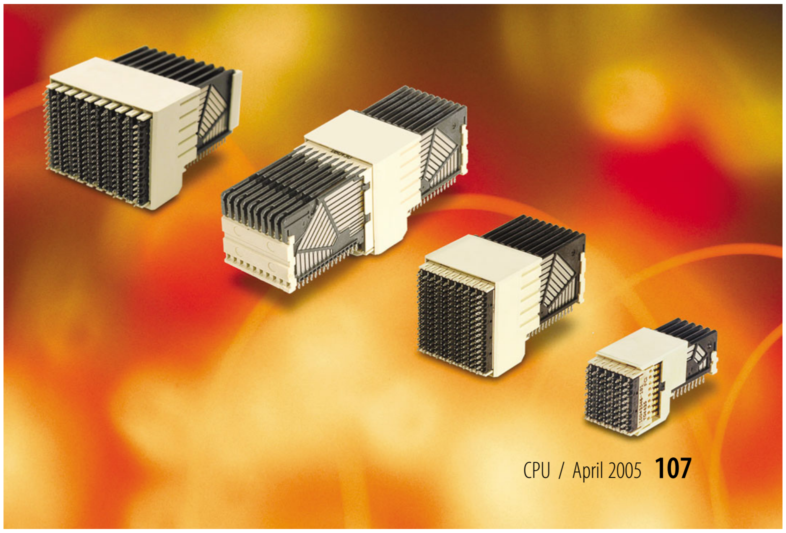
Bell Boosts Backplane Bit Rates

Consumers tend to get so worked up about little increases to our broadband connections, generally measured in hundreds of kilobits per second, that they ignore the real advances necessary to enable the apps we all want in our future. In networking, these advances usually happen at the top, deep inside the machines making up the critical core of the global data backbone. Lucent's R&D arm, Bell Labs, recently announced it had more than doubled the maximum transmission rates possible across an electrical backplane, (the PCB that hosts different devices used in the card cages found in high-end network switches and computers). Bell scientists achieved a blistering 25Gbps, yet this is still only a quarter of Bell's real objective.

"Although Ethernet rates have increased steadily over the last two decades," says Bell Labs' Martin Zirngibl, director of Photonic Networks Research, "consumer applications such as fast movie downloads are still not feasible with today's data networks. To allow the end-user experience to be the equivalent of picking a DVD from a shelf and watching it, network speeds would have to be scaled up significantly. To reach this goal, Bell Labs is actively pursuing technologies for 100Gbps Ethernet that would allow a tenfold increase in today's data rates."

Bell's 25Gbps advance relies on a new application of duobinary signaling, wherein three electrical signal values represent binary code. Bell is pushing to have this integrated into the future 802.3ap standard for 10G PHY networking owing to its bandwidth efficiency. The other half of the advance relies on next-gen connector technology from FCI. FCI's AirMax VS connectors achieved very low crosstalk up to 15GHz while using air (not metal) as a dielectric insulator.

Although Bell is still mum about when it hopes to hit 100Gbps, Zirngibl sees such speeds opening up broad new applications in areas such as telemedicine and military communications. ▲



Q&A With Senh Duong

If you're an experienced Web surfer with any interest in movies, odds are you've been to Rotten Tomatoes (www.rottentomatoes.com). Founded by Senh Duong, now 30, the groundbreaking movie-review site started as just another enthusiast's hobby page. In mid-2004, gaming-titan IGN Entertainment found Rotten Tomatoes too sweet to resist and snapped up the company. However, between those two points was a desperate struggle, and Duong still thinks the best of Rotten Tomatoes is yet to come.

Q Where did the name Rotten Tomatoes come from?

SD: At first, I just wanted to do something simple like Movie Reviews. Or I was thinking Thumbs Up because I'm such a huge fan of Roger Ebert and his show. But everything I could think of was bought out. So I ended up thinking, what's the most obscure thing that no one would take? Rotten Tomatoes. Because in the old days, when people would go see a theatrical production, if they didn't like it, they'd throw tomatoes at the actors.

Q Did you start Rotten Tomatoes because you're a movie buff?

SD: Pretty much. Actually, I'm a huge Jackie Chan fan. In the old days, when I lived in Sacramento, they used to play his movies in San Francisco, and I would get my brother to drive me two hours to the Bay area just to catch one of his films. Every time one of his films was released, I would do the same thing: go through the Internet and read every single review on it. Eventually I just thought, 'Hmm, this might be pretty useful for other people, to get a critical consensus on a movie before it opens.'

When I launched the site it got some recognition, so me and my college buddies looked at it and said, 'Maybe this could be an interesting opportunity,' being that the time, 1998, was at the peak of the Internet boom. We went out and got some investment money, about $1.2 million, and that's a great thing because months after we started, the crash happened.

Q Tell us about the crash period.

SD: When the Internet crashed everyone was thinking, 'Is this going to work? Is it time to cut our losses and go back to design?' We started with 24 to 30 people, and when it crashed, we chipped people off until we were down to six or seven. Even of those, some people had to go part-time. Patrick was our CEO, and he basically had to forgo his salary and only took commission on ad sales, which was pretty difficult. He even once lived in one of the cubicles to save money. Steven and I only took half our salary.

Q He took a cubicle and gave up his office?

SD: He took a cubicle and gave up his apartment. Basically, the shelves were his drawers, and he had a bed under his desk. When we said, 'Let's go over and hang with Pat,' we were just walking to his cubicle.

Q What held you guys together?

SD: We continued to get recognition, and our traffic continued to increase. We saw light at the end, and we felt like, 'Hey, maybe if we just ride through this thing, and if we weather this storm, maybe we can eventually be successful.' And that's what we ended up doing.

Q Before the crash, what was your revenue up to, and where did it hit bottom?

SD: I think before the crash we were around probably $60K to $80K per month. After the crash, sometimes we were lucky if we made $5,000 a month.

Q A lot of guys in your situation have taken the IGN money and cut loose. You could have bought a bar in Cabo, or become a *CPU* columnist, or something. But you stayed with the company.

SD: Yeah, pretty much everyone stayed with the company except for a couple of people whose positions were redundant, and they didn't feel like driving or making compromises to stay with the company. But everyone else stayed mainly because we're excited about the direction that IGN's going, and they wanted us to help them improve their entertainment division. We felt like that's a good challenge.

Subscribers can go to www.cpumag.com/cpuapr05/duong for bonus content.

William Van Winkle began writing for computer magazines in 1996. He was first published in 1990, the same year he took his first job in computers. He and his family live outside Portland, Ore.

AGP 8X

GV-N68T256DH NVIDIA GeForce 6800 GPU

- Powered by NVIDIA GeForce 6800 GPU
- Supports AGP 8X and DirectX 9.0c
- Integrated with 256MB DDR memory
- Features DVI-I, TV-Out and D-Sub connectors
- Supports GIGABYTE "V-TUNER 2 Plus" overclocking and hardware monitor application
- Bundles "DOOM3" and PowerDVD 5.0

DirectX 9.X

GA-K8NSNXP 939 NVIDIA nForce3 Ultra Chipset

- Socket 939 for AMD Athlon™64 FX /Athlon™64 processor
- GIGABYTE unique Dual Power System Gold (DPS-Gold) design
- Supports Dual Channel DDR400 memory architecture
- Dual LAN solution with Gigabit LAN solution integrated
- Integrated Serial-ATA interface with RAID 0,1 function
- Integrated T.I. IEEE 1394b FireWire interface
- Integrated high quality 8 channel Audio Codec

IEEE 1394b | Dual LAN | USB 2.0 | DualBIOS™ | EasyTune™ 4 | 8-Channel Audio with UAJ

K8 Triton™ series

GA-K8NS Ultra-939 NVIDIA nForce3 Ultra Chipset

- Socket 939 supports AMD Athlon™64 FX/ 64 processor
- Supports Dual Channel DDR400 memory architecture
- Dual LAN solution with Gigabit LAN solution integrated
- Integrated Serial-ATA interface with RAID 0,1 function
- Integrated T.I. IEEE 1394b FireWire interface
- Integrated high quality 8 channel Audio Codec

IEEE 1394b | USB 2.0 | DualBIOS™ | EasyTune™ 4 | AGP 8X | 8-Channel Audio with UAJ

Available Through: *For other regional distributors, please contact G.B.T. INC (U.S.A.)*

www.outpost.com
www.newegg.com
direct.mwave.com
www.pcclub.com
www.microcenter.com
www.tigerdirect.com

* These speed settings are not guaranteed by GIGABYTE.
-- The specification and pictures are subject to change without notice.
-- All trademarks and logos are the properties of their respective holders.
-- Any overclocking is at user's risk, Giga-Byte Technology shall not be responsible for any damage or instability to your processor, motherboard, or any other components.

Upgrade Your Life™ www.gigabyte.com.tw

GIGABYTE™ TECHNOLOGY

your game
axcelerate
eXtraordinary gaming desktops and laptops
Axcelerated system performance
Axcelerated vapor cooling

AXCELERATE- X-HYPERION

17 Inch 1680 x 1050 WSXGA+ SCREEN
AXCELERATE CASE W/ 4 SPEAKERS AND SUBWOOFER
AMD 3000+ CPU
512 MB 400 MHZ DDR RAM UP TO 2GB
40 GB HD up to 80GB
CD BURNER OPTIONAL DVD R/RW
AX CMOS Camera/Web CAM
128 MB 8x AGP ATI 9700 MOBILITY RADEON VIDEO CARD
INTERGRATED 802.11 g TURBO WIFI CARD
56k V 90 MODEM and 10/100 INTERGRATED ETHERNET LAN CARD
OPTIONAL TV TUNER CARD
COMFORT KEY-FULL SIZED KEYBOARD AND NUMERIC PAD
INTELI TOUCH MOUSE WITH SCROLLBAR
MICROSOFT XP PRO SP2
1 year service warrenty with 24/7 tech support and next business day on-site service

AXCELERATE- X2

600 Watt- Silent Power Supply
Axcelerated Ultra Cooling
ASUS A8V DELUXE Mother Board
AMD 64-FX 53 939 CPU- AXCELERATED
NVIDIA GEFORCE 6800 ULTRA 256 MB ADVANCED VIDEO CARD
1 GB GEIL ULTRA PERFORMANCE 550 MHZ DDR RAM
74 GB 10K RPM WESTERN DIGITAL RAPTOR DRIVE
300 GB 7200 RPM 16MB BUFFER MAXTOR DIAMOND HD
BENQ 16x DVD R/RW +- DOUBLE LAYER DRIVE
54/32/54 CD-R/RW DRIVE
AX 7 in 1 card reader
Floppy drive
CREATIVE LABS AUDIGY 2 PLATINUM PRO
MICROSOFT XP PRO SP2
IDEAZON ZBOARD KEYBOARD W/ CROSSFIRE
MICROSOFT OPTICAL MOUSE
1 year service warrenty with 24/7 tech support and next business day on-site service

NSIST ON NVIDIA

AMD 64 Athlon™ FX

Starting at
$2890

Starting at
$2963

For latest technologies, news, prices, and promotions visit
www.axcelpc.com • 888-289-2923 (BUY AXCEL)

Purchaser is responsible for all freight costs on all returns of merchandise. Full credit will not be given for incomplete or damaged returns. Absolutely no refunds for merchandise returned after 30 days. All prices and configurations are subject to change without notice and obligation. Opened software is non-refundable. All returns have to be accompanied with an RMA number and must be in re-sellable condition including all original packaging. Taxes and shipping charges are not shown. For complete information on policies of the company or service/warranty please visit www.axcelpc.com. System's picture may include some equipment and/or accessories, which are not standard features. Not responsible for errors in typography and/or photography. All rights reserved. All brands and product names, trademarks or registered trademarks are property of their respective companies.